

THE WORLD'S BEST-SELLING APPLE MAGAZINE

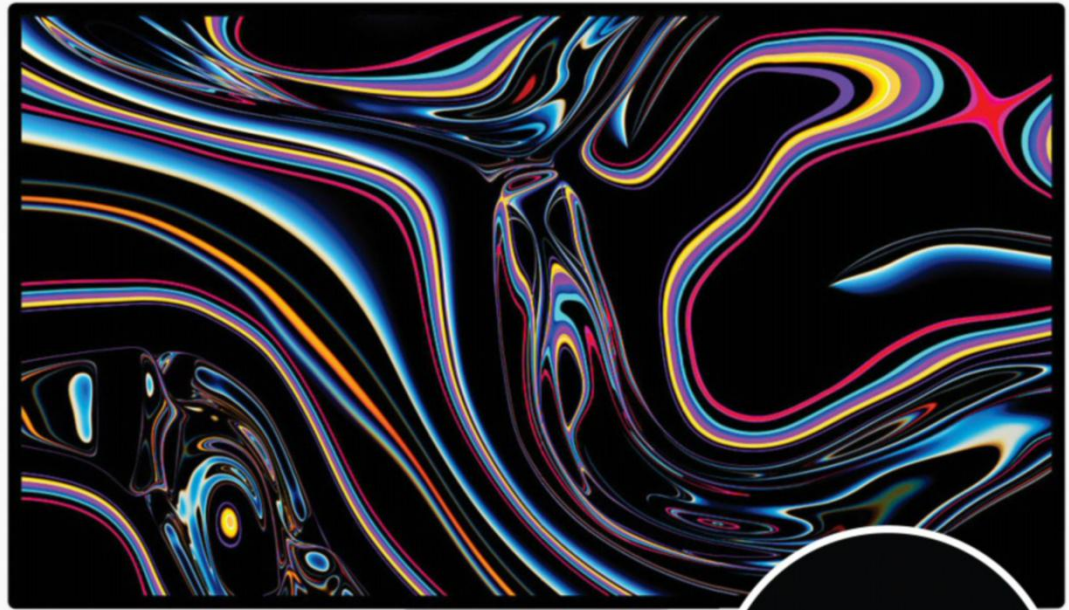
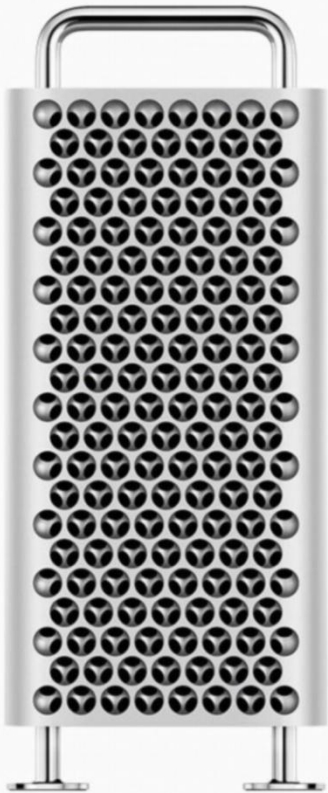
Macworld

JULY 2019 ● IDG

Apple
unveils

NEW

Mac Pro and Pro Display XDR



FIRST LOOK:
macOS 10.15
Catalina

+ WWDC 2019: EVERYTHING APPLE ANNOUNCED

● iOS 13 ● iPadOS ● watchOS 6 ● tvOS 13

CONTENTS



WWDC 2019

- 4** Everything Apple announced at WWDC 2019
- 22** 5 announcements that will have the greatest impact
- 31** New Mac Pro: 3 reasons to excited about workstation
- 39** Guide to macOS Catalina
- 57** iTunes changes on macOS 10.15 Catalina
- 63** iOS 13 features Apple didn't announce at WWDC
- 67** With iPadOS, Apple's dream of replacing laptops finally looks like a reality
- 77** 6 ways Apple is turning its watch into a mini iPhone
- 81** tvOS 13: 6 cool new features to check out
- 86** The star of WWDC wasn't the Mac Pro. It was privacy

FEATURES

- 92** Apple upgrades processors in MacBook Pro line-up
- 95** Apple improves the butterfly keyboard (again)
- 97** What Intel's road map updates mean for the Mac
- 104** Apple's surprise iPod touch refresh
- 106** New Apple TV app is here

OPINION

- 109** Why the Mac Pro is Apple's love letter to forgotten die-hard Mac fans



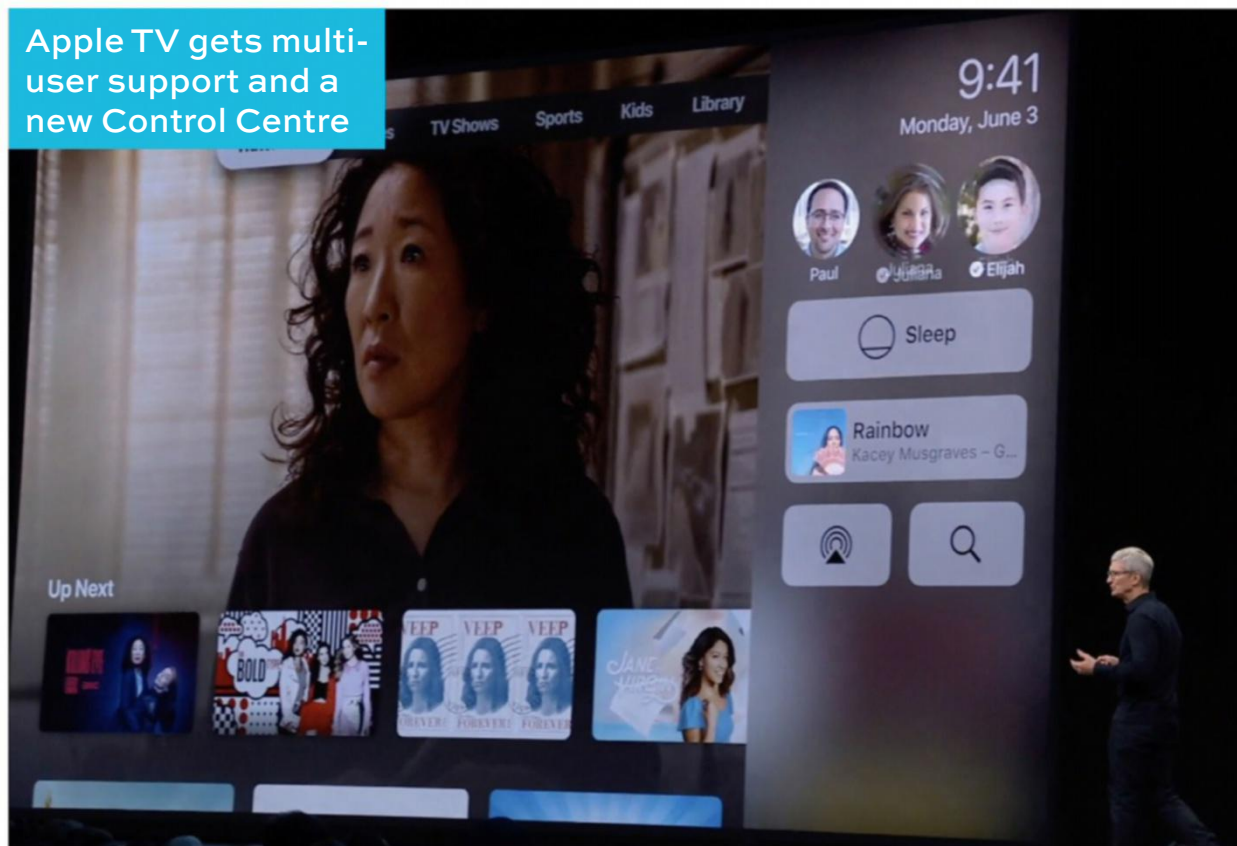
Everything Apple announced at WWDC 2019

Don't have time to watch the two-hour presentation? Here's a breakdown of Apple's announcements. [Jason Cross](#) reports



Apple's big WWDC keynote is over, and the tech giant had a lot to say in its over-two-hour presentation. If, however, you don't have time to sit through the whole thing and want to catch up quickly, here's a summary of the highlights.

Apple TV gets multi-user support and a new Control Centre



tvOS

Apple kicked off the conference by talking about updates to tvOS, which runs on its Apple TV HD and Apple TV 4K products. It was recently given a refresh with the new TV app (see [page 77](#)), and now Apple is giving us a look at how the entire operating system will change in the autumn.

New home screen: The Apple TV home screen will now play full-screen preview video that suggests content you may want to watch.

Multi-user support: You can add multiple users to your Apple TV and they'll each get their own

personalized suggestions and use their own Apple Music playlists and recommendations.

Control Centre: A new Control Centre slides in from the right side of the screen, giving you quick access to changing users, lets you dim the display, and more.

Lyrics in sync with Apple Music: Apple Music's lyrics now sync up with the song.

Game controller support: Apple TV will support the Xbox One controller (newer models with Bluetooth) and the PS4 DualShock controller. This support is coming to iPhone and iPad, too.

Undersea screen savers: Apple partnered with the BBC's Natural History Unit to shoot 4K HDR underwater footage to make new screen savers.

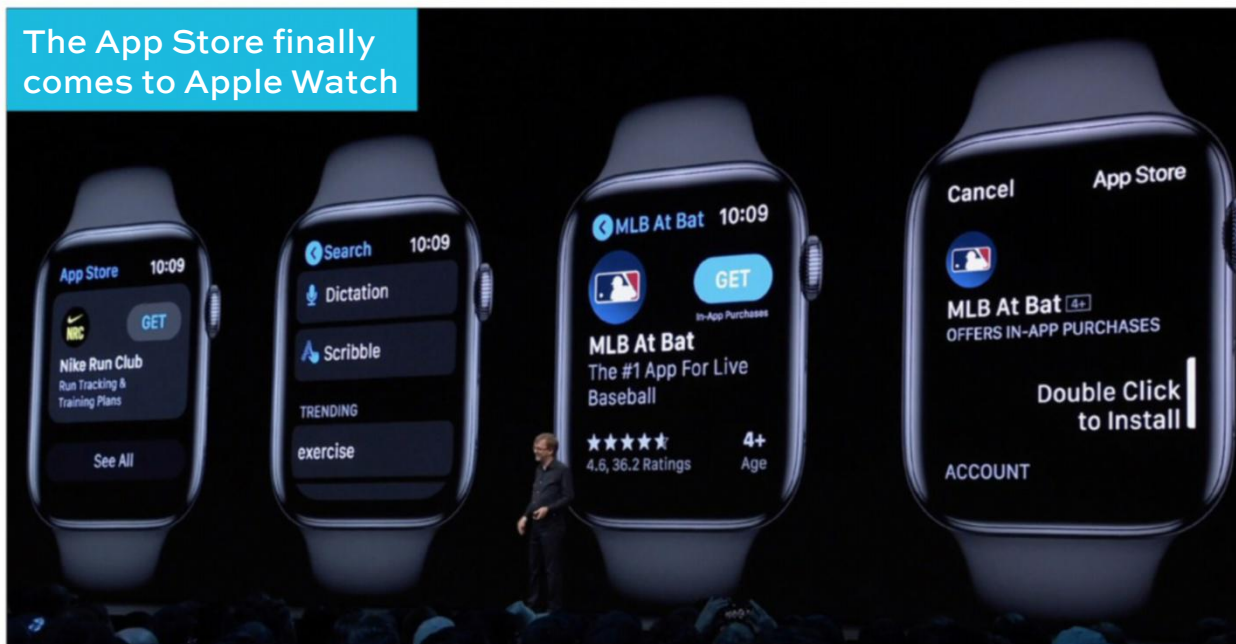
watchOS 6

Apple Watch got a lot better with the Series 4, and watchOS 6 takes it a big leap forward. Apple is aiming to make this a whole platform unto itself. For more about what's new in watchOS 6, see [page 77](#).

New watch faces: Six new faces with lots of different customization options, including colour and the choice to show full-screen or circular faces that support rich complications.

Taptic chimes: Your Apple Watch can now tap your wrist on the hour, and play a chime if the sound is on.

The App Store finally comes to Apple Watch



Apple gave the example of a robin's song, though we assume different faces have different chimes.

New built-in apps: Audiobooks lets you, well, listen to audiobooks. Voice Memos comes over from iOS. Most useful is the calculator app, which includes functions for calculating tips or splitting the bill.

Independent apps: Watch apps can run on the watch without needing a companion iPhone app.

Watch App Store: There'll be an App Store on the watch itself. Browse or search with dictation or scribble, or ask Siri. Purchase and install apps directly on your watch.

New features for developers: Apps have an extended runtime API that lets them track

motion for longer periods of time. This means big improvements to health and fitness tracking apps. There's also a new streaming audio API that lets music apps stream content instead of requiring you to download it.

Activity trends: Together with the Health app on your iPhone, you can now see not just your daily activity, but how it's trending. Apple compares your last 90 days to the past 365 to see if you're improving in nine key metrics.

Hearing health: A new app on the Apple Watch will measure ambient noise and warn you if it's loud enough to impact your hearing. You can see it in real time in the watch app or on a complication on your watch face. To protect your privacy, audio is only periodically sampled and never stored or saved.

Cycle tracking: The Apple Watch and Health app on iOS can help women track their menstrual cycles, receive fertility window notifications, and even predict when their periods are about to start.

Apple showed a slide with lots of other small features, such as automatic app updates, a complication that informs you of the chance of a rain, a redesigned walkie-talkie, and more.

iOS 13

Apple now produces one of the most popular and influential consumer operating systems in the

iOS 13 should be even faster than iOS 12, which is an impressive feat to say the least

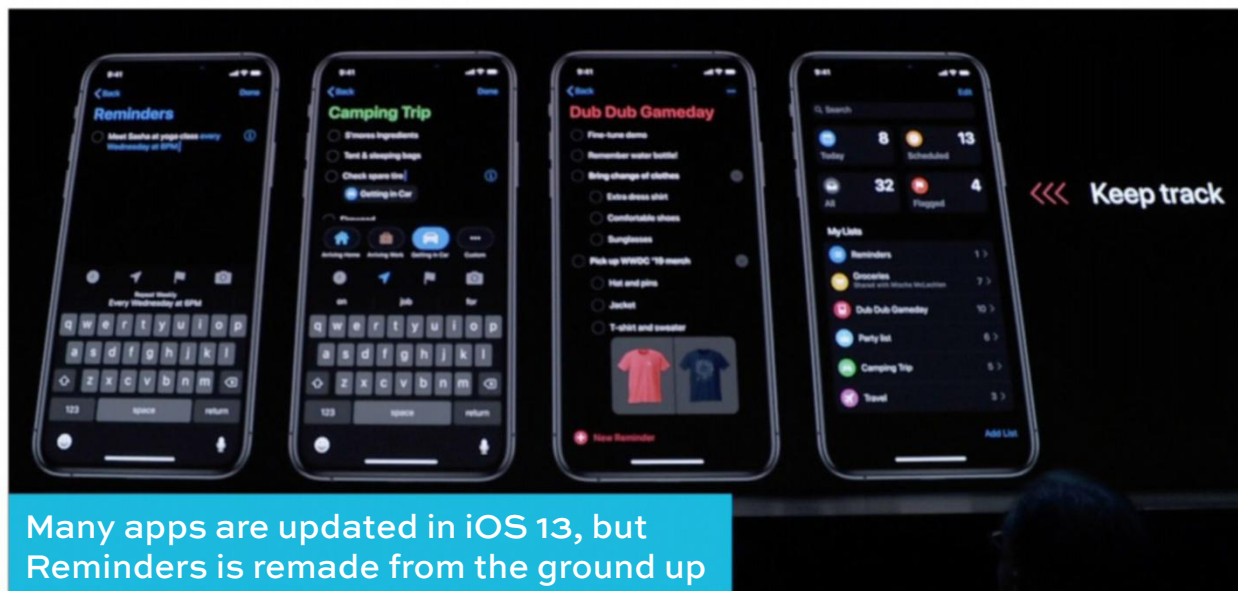


world, as iOS is on over a billion devices. As you can expect, iOS 13 is chock-full of new features. Here are the highlights from the keynote.

Performance: Senior VP Craig Federighi said Apple worked “top to bottom...making everything faster that you do the most”. A few examples: Face ID unlocks 30 percent faster, apps are packaged differently to be 50 percent smaller (and updates are 60 percent smaller). These changes will help apps load twice as fast.

Dark Mode: After macOS got a Dark Mode last year, iOS gets it this year. All of Apple’s apps now have no colours with dark backgrounds, and it even extends to wallpapers, widgets, and notifications.

Synced lyrics in Apple Music: Lyrics will sync in time with the song, moving up the screen to highlight the current phrase.



Many apps are updated in iOS 13, but Reminders is remade from the ground up

QuickPath keyboard: Swipe your finger across the letters to type, if you prefer.

Safari: New quick font sizing options with per-website preferences.

Mail: Much richer text formatting controls, including support for rich fonts.

Notes: A new gallery view, support for shared folders, and much more.

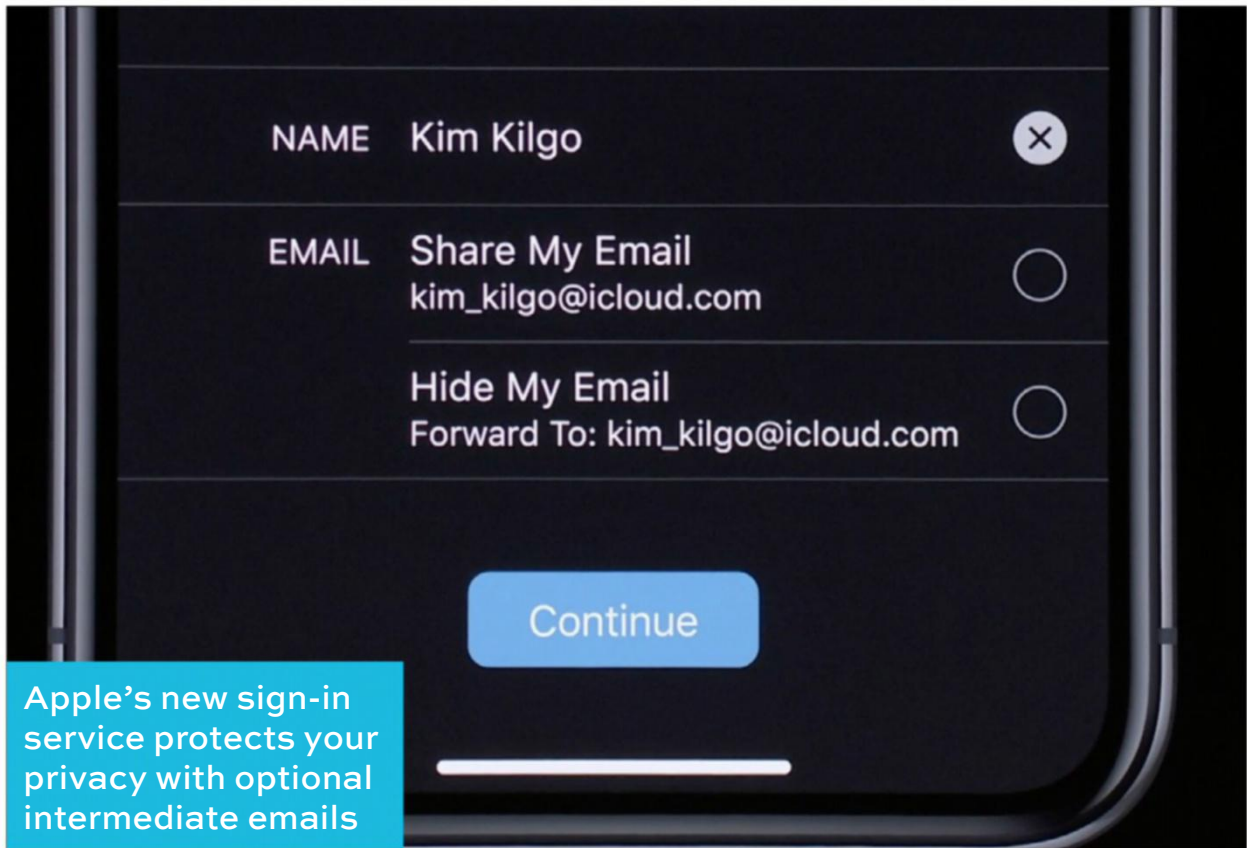
Reminders: A complete ground-up remake with intelligent text recognition for dates, times, and places. Alternatively, you can use the new QuickType bar to add those things. Tasks let you associate to-dos with a top-level reminder. Tag people and you'll get notifications in the Messages app when you talk to that person.

Apple Maps: The work that began with completely overhauling Maps data in Northern California will spread to the whole US by the end of 2019, and the rest of the world in 2020. Maps also now lets you assign new favourites to quickly access them from the launch screen, or build collections of places that you can share with others.

Some locations will have up-close, ground-level 3D views called ‘Look Around’ to help you explore. Maps also gets real-time travel information, the ability to share your ETA with people, and flight status for airports.

Privacy protections: You can allow an app to use your location just once (it will have to prompt you again next time you use it). Apple will send you warnings about apps that continue to track you in the background. And it will close the loophole that allowed apps to look at Wi-Fi hotspots and Bluetooth beacons to estimate your location without asking for it.

Sign in with Apple: Those ‘Sign in with Google’ and ‘Sign in with Facebook’ buttons are about to be joined by one from Apple. Only, Apple won’t share any of your personal details with the app. And if the app requires an email address, you can give your real one, or Apple will generate a fake one that forwards to your real one, so the app developer won’t even get a real email address. Sign in with Apple will be available across all Apple platforms and on the web.



Apple's new sign-in service protects your privacy with optional intermediate emails

HomeKit Secure Video: A new, more secure setup for home video cameras. Video is analysed in the home, then encrypted and stored on iCloud where nobody can see it. Your paid iCloud subscription comes with 10 days of storage that won't count against your iCloud data limit. Initial products are coming from Logitech, Eufy, and Netatmo.

HomeKit routers: Apple will licence routers to work with HomeKit accessories, firewalling each one off individually so that no single compromised device can affect others. The first HomeKit-enabled routers are coming from Linksys, Eero, and Internet provider Spectrum.

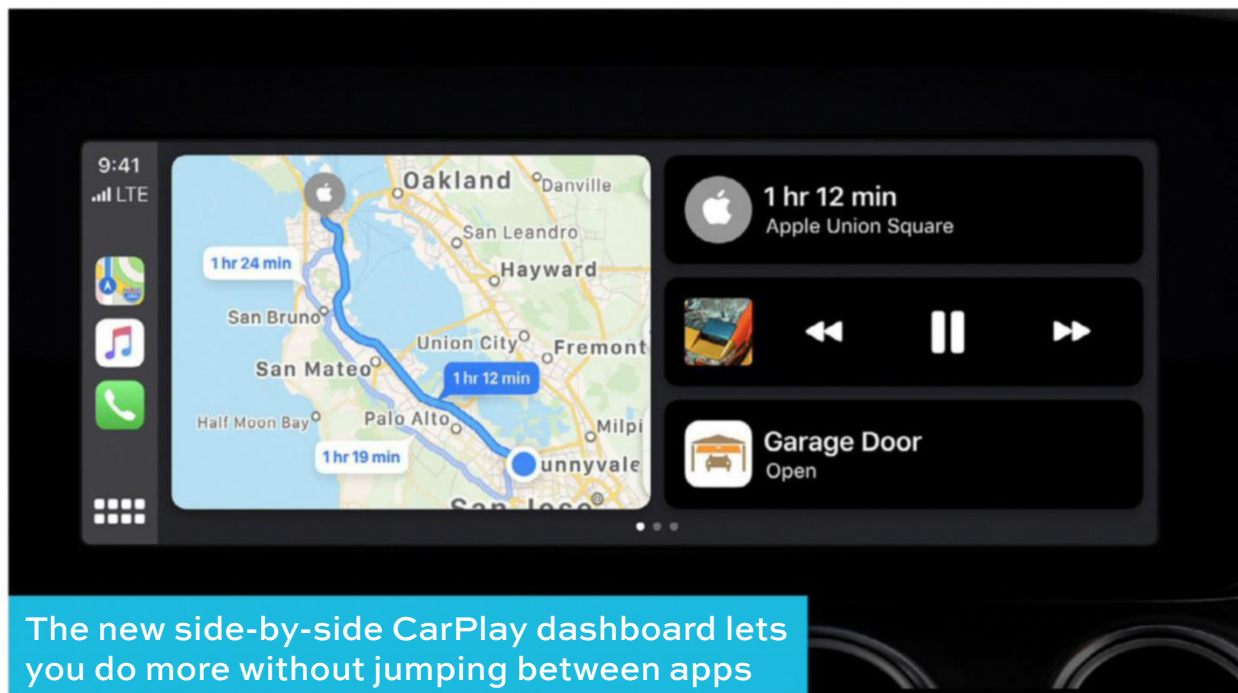
Name and image in Messages: You can add your name and image to Messages, and then automatically share it with your contacts, or everyone if you prefer. That way, people won't just see a blank image and phone number when you message them.

Memoji and Animoji: Memoji are getting a huge boost, with tons of new hair, make-up, and accessories. iOS 13 will automatically create a sticker pack from your Memoji that mimic the expressions of popular emoji. The Memoji editor and stickers are coming to all platforms with an A9 chip or better (but you still need a device with Face ID to do the live face-tracking stuff).

Photos: You can adjust the strength of Portrait Lighting in the Camera. There are lots of new adjustments for editing apps in Photos, and you can now edit videos as well, which includes rotating them. The Photos app gets a new browsing experience that uses intelligence to show your best, most relevant images by year, month, and day.

AirPod enhancements: Share music with a second person's AirPods by tapping phones together. Plus, Siri can now read your incoming messages as soon as they arrive, and you can respond without triggering Siri. It works with any third-party messaging app that supports SiriKit.

HomePod enhancements: Bring your iPhone close to your HomePod to instantly hand off whatever



The new side-by-side CarPlay dashboard lets you do more without jumping between apps

you're playing. Siri can play over 100,000 radio stations. HomePod also gets multi-user support, with the ability to recognize multiple voices and use each person's own Music, Reminders, Messages, Notes, and so on.

CarPlay improvements: Apple's biggest CarPlay update ever. A new dashboard puts your map next to your music and Siri smart suggestions, so you don't have to flip back and forth. Siri doesn't take over the entire display anymore, and it will work with third-party music and mapping apps.

Siri Shortcuts: The Shortcuts app is now built into iOS 13 (so you don't need to download it separately), and it includes a new personalized step-by-step way to create your own automations.

The new Files app works with USB drives, SMB shares, and has a useful new Column view



Siri's new voice: A new 'Neural Text-to-Speech' voice uses machine learning to create a completely artificial voice with more natural cadence and smoother-sounding complex words.

iPadOS

The iPad gets its own operating system. It's based on the fundamentals of iOS and gets all the improvements of iOS 13, but there are enough new, iPad-only features that Apple has decided to give it its own name. Here are the highlights.

New Home screen: A tighter grid of icons lets you put more stuff on the screen. You can pin widgets to keep them on the Home screen, too.

Slide Over improvements: It's easier to move between apps that are hovering over the right side of your screen in Slide Over mode. Just use it like you do newer multitasking on newer iPhones: drag up from the bottom to see a list of all Slide Over apps, or drag left and right across the bottom to swap between them.

Split View improvements: You can run the same app side by side with itself. See two different notes at the same time, or two Word documents.

Files app: The Files app gets a handy new column view, iCloud Drive folder sharing, SMB network support, and USB drive support.

Safari: On the iPad, Safari will display the desktop versions of sites, only optimized for the iPad size and touch. Safari also gets a download manager and 30 new keyboard shortcuts.

Fonts: You can easily install new fonts by downloading directly from the App Store.

New multitouch features: Grab and drag scroll bars. Move cursors by just touching and dragging. Directly drag on text to select it – no double-tapping or magnifying glass. Do a three-finger 'close' gesture to copy text, repeat it to cut text, and then do a three-finger 'expand' gesture to paste it. A three-finger swipe serves as a new undo gesture.

Apple Pencil: The low 20ms latency has been reduced to a mere 9ms. There's a redesigned Pencil tool palette, and a new PencilKit API for developers. Drag your pencil up from the corner of the screen to mark up anything on any app. Compact keyboard: Pinch the iPad's keyboard with two fingers to get a small, iPhone-sized keyboard.

Mac Pro and Pro Display XDR

Apple finally unveiled its new Mac Pro desktop computer, which will be available this autumn. Prices start at \$5,999 (£tbc) for the computer and \$4,999 (£tbc) for the display.

The Mac Pro features an all-metal design reminiscent of the old beloved 'cheese grater' Mac Pro. It sports an Intel Xeon processor with eight,



The new Mac Pro and Pro Display XDR are impressive but very expensive

12, 16, 24, or 28 cores. There are 12 DIMM slots that allow for a maximum of 1.5 terabytes of ECC DDR4 system memory. There are eight PCI expansion slots, including four double-wide slots and four single-wide slots. Two of the double-wide slots are ‘MPX’ modules that deliver extra power. There’s an extra half-length x4 PCIe slot with an I/O slot installed to add Thunderbolt and USB ports.

Apple built a brand-new hardware accelerator card called Afterburner that has an FPGA chip (a programmable processor) that is optimized to process ProRes and ProRes RAW video.

The Mac Pro has a 1.4-kilowatt power supply.

The Pro Display XDR is a 32in LCD with a 6K resolution of 6,016x3,384. It’s got true 10-bit colour and DCI-P3 colour gamut, a 1,000,000:1 contrast ratio, and a sustained full-screen brightness of up to 1,000 nits, with a limited peak of up to 1,600 nits. The stand is sold separately for \$999 (£tbc), or you can buy a VESA mount for \$199 (£tbc).

macOS Catalina

macOS 10.15 has its California-inspired name, and it’s Catalina. It’s biggest new feature is the ability for developers to easily deploy apps made for iOS, but Apple announced plenty of other new features.

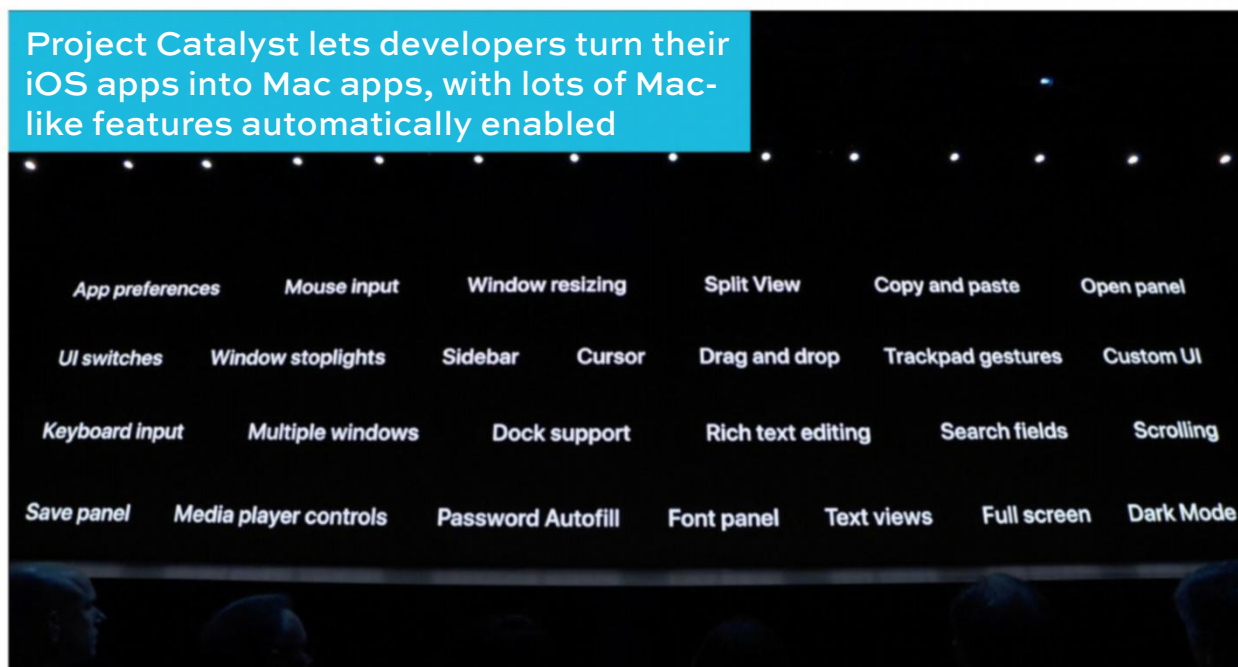
iTunes breakup: iTunes is going away, replaced by three more focused apps: Apple Music, Apple Podcasts, and Apple TV. The devices you used to manage and sync with iTunes will instead be managed in the Finder.

Sidecar: This will let you use your iPad as a secondary display for your Mac, or as a graphics tablet in art apps, either wired or wirelessly.

Voice Control: Control your Mac or iOS device entirely with your voice. It's developed as an accessibility feature but could be very useful for anyone.

Find My: This feature combines Find My iPhone with Find My Friends, and is now available both on Mac and iOS. It can even find devices that are no longer connected to the network using secure Bluetooth beacons that are end-to-end encrypted and anonymous.

Activation Lock: All Macs with a T2 security chip can have Activation Lock enabled. It works just as



it does on iPhone or iPad, preventing a thief from ever being able to activate your device without your Apple ID.

Screen Time: All the features already found in iOS are now brought to the Mac.

Project Catalyst: Previously code-named ‘Marzipan’, this is a new technology that lets developers quickly and easily create Mac apps using the tools and techniques they use to make iPhone and iPad apps. Developers can open any iPad-compatible project in Xcode and check the Mac checkbox. Xcode will automatically add Mac-specific features, giving developers a big head start. Developers can then add finishing touches to make it even better on the Mac.

For a more in-depth look at the OS, see [page 39](#).

AR and Swift tools for developers

Of course, WWDC is a developer conference. While Apple spends most of its keynote showing off features that users can appreciate, there were lots of breakout sessions throughout the week that looked at new tools for developers.

During the keynote, Apple touched briefly on two specific areas: augmented reality (AR) and its Swift programming language.

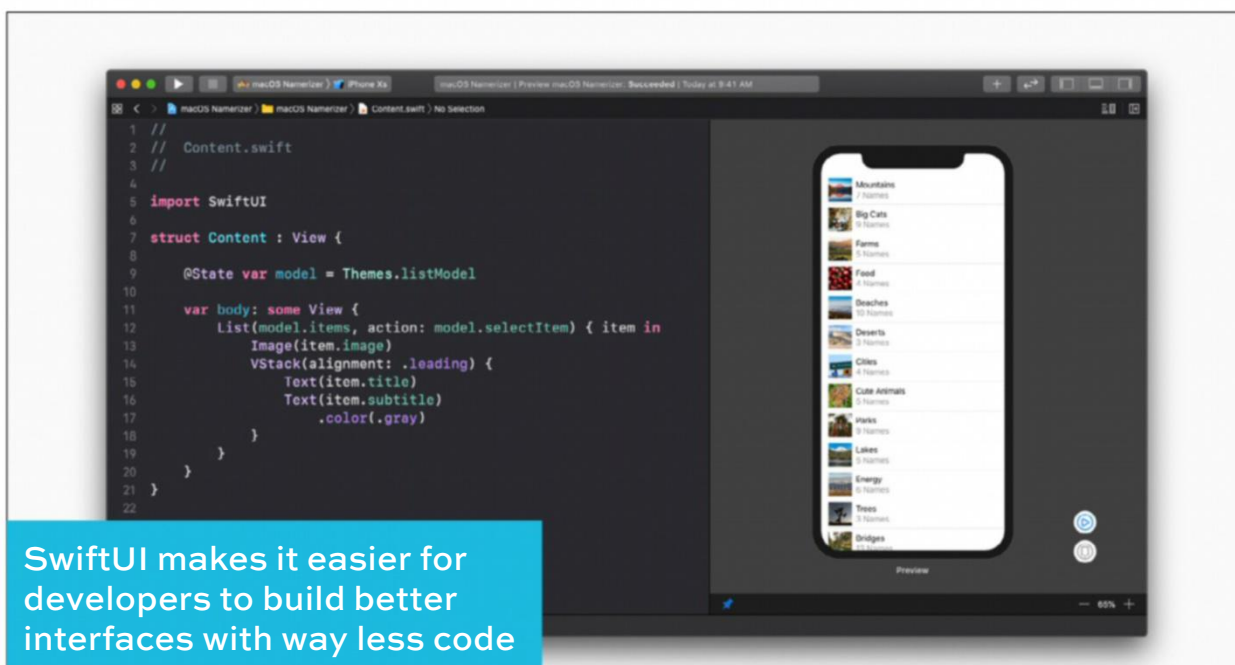
RealityKit: A new toolkit for developers who want to make AR apps but don’t know much about

3D rendering. It incorporates rendering, camera effects, audio, physics, and more.

Reality Composer: A new app for developers that has a drag-and-drop interface to create AR scenes using a big library of already-made 3D objects and animations.

ARKit 3: The latest version of Apple's AR toolkit is a big upgrade. It features new object and image detection, motion capture, and People Occlusion to integrate real people into AR scenes with automatic compositing.

SwiftUI: A totally new framework to make it easier for developers to build better interfaces with a lot less code. It will work across all Apple's products, including iPhone, iPad, Mac, and even Apple Watch.



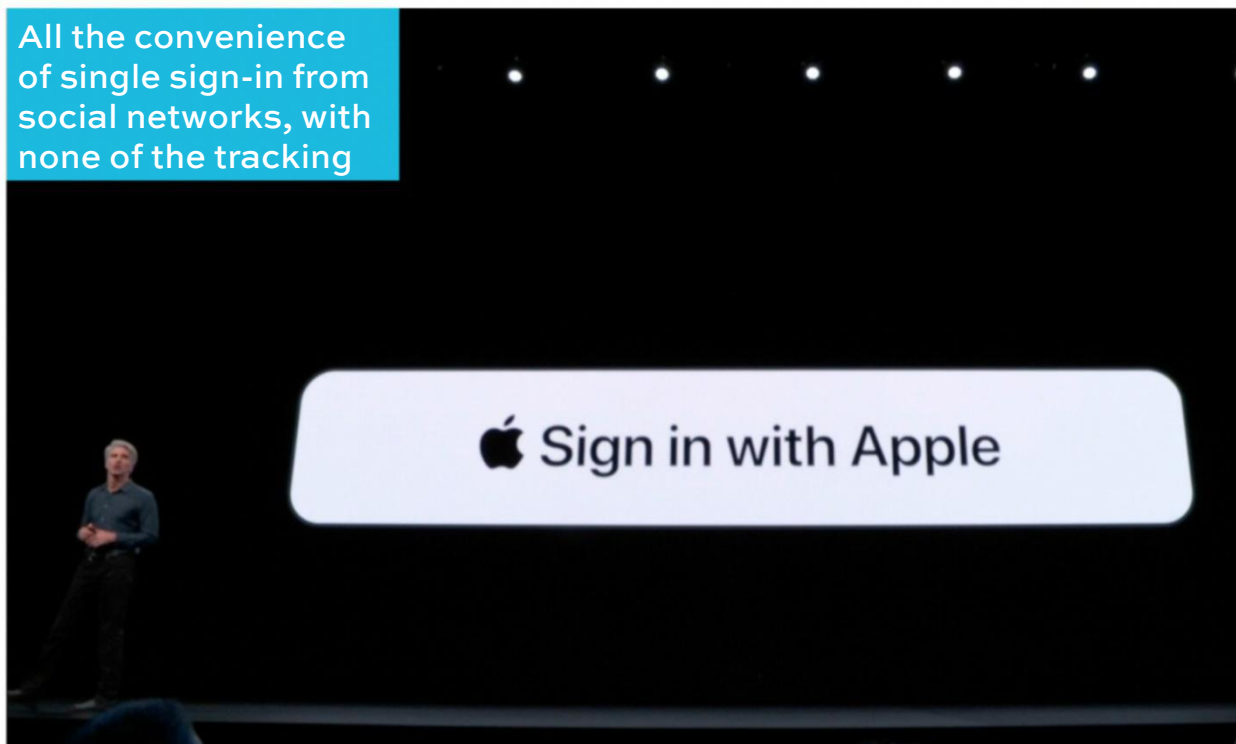
5 announcements that will have the greatest impact

These are the things that will really make a big difference for a billion Apple users. **Jason Cross** reports



Everybody is talking about the Mac Pro and the Pro Display XDR (see [page 17](#)), but at those sky-high prices, Apple is going to be lucky to sell even a million of them. They're very cool products for serious creative professionals, but they don't mean anything at all for the vast majority of the billion-plus Apple users out there.

All the convenience of single sign-in from social networks, with none of the tracking



Some of the other things Apple announced will have much bigger consequences for you.

1. Privacy crackdown

Take the new privacy stuff in iOS 13 (see [page 11](#)). It's not sexy, but it may drastically change the way popular apps operate.

Right now, many apps let you sign in using Google or Facebook. This is convenient, but it also gives the app – and Google or Facebook – all sorts of data about you. Personal info you didn't even know you were sharing.

The new 'Sign in with Apple' feature gives you the same convenience, but protects your privacy because it doesn't share any hidden personal details. It can even hide your email address behind

a randomized fake forwarding address. Apple doesn't get a bunch of tracking data from the app, and the app doesn't get all sorts of personal information from Apple.

Apple's even making an App Store policy that requires any app that allows single sign-in buttons (like the Google or Facebook ones) to also include Sign in with Apple. Plus, Apple is cracking down on apps that scan nearby Wi-Fi hotspots and Bluetooth beacons to figure out your location, even though you didn't ask it to.

These changes may sound kind of dry, but it means thousands of popular apps are going to have to find a way to make money other than gobbling up all your personal information without telling you about it. That could be huge.

2. Enter iPadOS

Another big change is the split of iOS and what Apple is now calling iPadOS. Obviously, the iPad has had features you don't find on the iPhone for years, but as they've grown even further apart Apple is recognizing the iPad's unique capabilities with a name change.

Sure, iPadOS is iOS 13 with iPad exclusive features, just as iOS 12 had features on the iPad that weren't on iPhone. It's not a new code base or anything. The naming change is indicative of a change in the way Apple thinks about its tablets. It's a vision statement, a declaration that Apple is actively growing the iPad into a product you can do 'real work' with. As it lifts away the long-standing

Introducing iPadOS

Yes, it's still iOS with exclusive features, but the iPadOS name change indicates a clear and exciting vision

limitations of iOS, it no longer seems appropriate to call it iOS.

When you think about it, the writing was on the wall from the moment Apple replaced the Lightning port on the iPad Pro with a USB-C port. The iPad is no longer just a big iPhone (as the old slander goes) and that's going to become even more apparent as iPadOS grows further from iOS over the next couple years.

3. Apple 'gets' gaming?

Games are the most popular category in the iOS App Store, but Apple's deliberate gaming moves have almost always fallen flat. Game Centre is a bust, Macs still suffer from lots of systemic problems when it comes to playing games, and

the history of Apple trying to do gaming things is littered with failures.

I mean, we all know that a billion people play games on an iPhone, but core gamers don't think of that as 'real' gaming (whatever that means). And nobody really games on a Mac, right? The long-standing critique of Apple is that it simply doesn't 'get' gaming. Not game developers, and not gamers. It's only because the iPhone is such a gigantic target market with predictable hardware that game developers flock to it.

At WWDC, Apple announced that the Apple TV, iPhone, and iPad will officially support Xbox One and PS4 controllers. That completely changes the game – no pun intended – and means big things for the Apple Arcade service coming this autumn.

Developers can now make so-called 'real games' for the service. The kind they're used to making; the ones that rely on the controllers that tens of millions of core gamers use every day on their Xboxes and PlayStations.

This is a complete capitulation by Apple. There has been no technical reason for it not to do this. Instead, it insisted on only supporting specially-licensed MFi controllers.

Why the sudden change? It's all about Apple Arcade. The iPhone is such a huge business that Apple can have a 'you need us more than we need you' attitude toward game development for it. But developers don't need to sign on with Apple Arcade. If Apple is going to have real premium content for this upcoming subscription service – which is

Big cheers from the audience as Tim Cook announced Xbox One and PS4 controller support



clearly critical for getting it off the ground – it’s going to need to listen to traditional ‘core’ game developers and gamers.

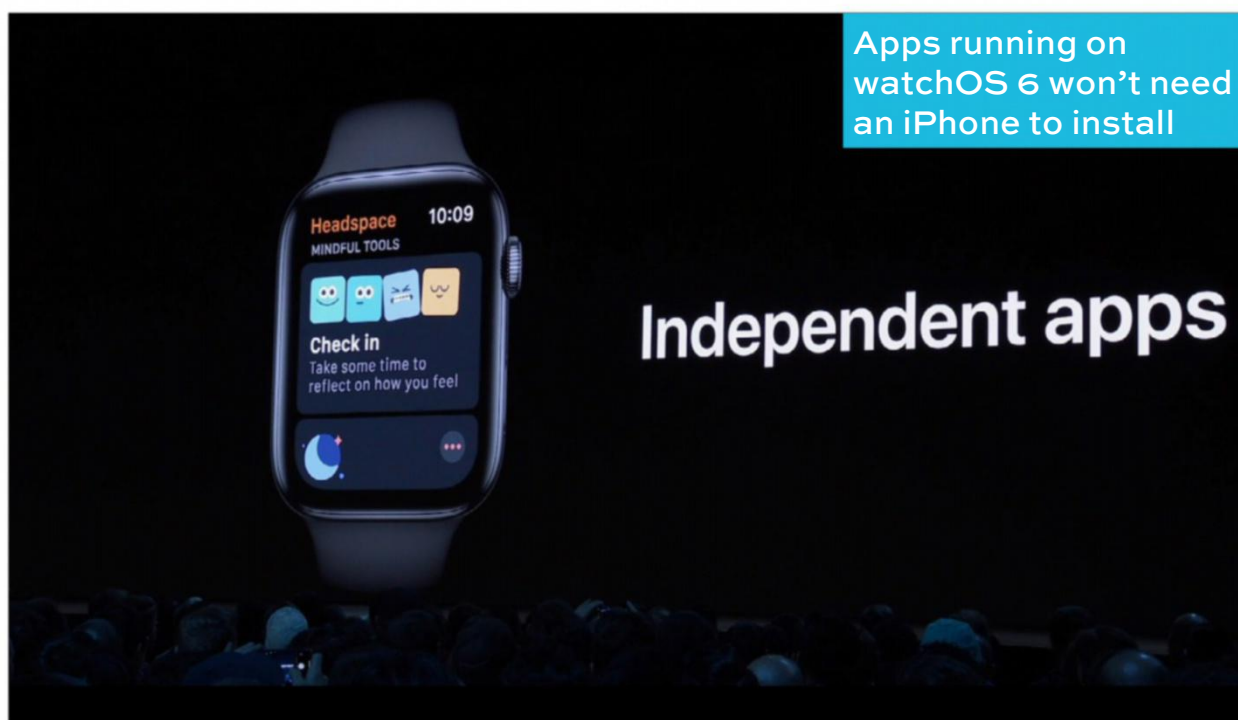
Supporting popular console controllers on its platforms is a clear indication that Apple’s attitude has changed, and it’s starting to listen to what developers and gamers actually want.

Certainly, Apple’s got further to go. Consumer-grade Macs should be better game machines, and that means better GPUs in base Mac models, better input and audio frameworks for game developers, and more effort put into optimizing the OS and drivers for games, specifically. But if Apple is willing to effectively kill it’s MFi program for game controllers to support popular competing gaming products, anything is possible.

4. Apple Watch starts to break away

Apple is making some big changes to watchOS, too. There's the usual slate of new apps and watch faces, but there are even bigger changes to the way you get apps in the first place. To date, the Apple Watch has been strictly an iPhone accessory. Every Apple Watch app needs an iPhone companion app, and you have to find and install those apps on your connected iPhone. With watchOS 6, you'll be able to browse the App Store, buy, download, and run apps entirely on your Apple Watch.

Apple is getting dangerously close to making it possible to buy and use an Apple Watch completely on its own. It's not there yet: you still need an iPhone to use your Apple Watch with watchOS 6 (to set up your Apple ID, and so on). But Apple is so



close to making Apple Watch an entry point into the Apple ecosystem for millions people. The first Apple device they buy.

It's not a bad idea for such a popular and coveted piece of tech.

5. iOS apps on Mac will be huge

Finally, maybe the biggest thing Apple announced at WWDC was Project Catalyst. This used to go by the code name Marzipan, and is a set of tools that make it almost trivially easy for any developer with an iPad app to get it running on the Mac, with very little extra code.

Apple said developers they tested this with got their Mac apps up and running in as little as a day. It will take longer for a lot of devs, especially if they do extra work to make the Mac version more Mac-like,



but it's a huge start. It's going to be outrageously popular and result in an explosion of Mac apps.

Once there are tens of thousands of popular iPhone and iPad apps on the Mac, we could be looking at a real surge in Mac sales. After all, ten times as many people have an iPhone than a Mac. When they go to buy a computer one day, are they going to get the one that has all the exact same apps they love on their iPhone, or one where they have to start over with a new software library from scratch?

Making it easy to convert iOS apps into Mac apps could result in the greatest selling point the Mac has had in a decade or more.

Of course, the world has mostly moved on from traditional computers. People have them, they use them at work and at home, but they don't upgrade often. Catalyst isn't going to change that and make laptops the 'Hot Thing' in tech again. The world is still going to be all about those phones and tablets.

But it could, after a couple years, completely change our expectations for apps. We may start to expect any good app to follow us seamlessly from phone to tablet to laptop to desktop. That all starts with Apple taking the world's most influential and robust mobile app development environment and bringing it to the Mac.

New Mac Pro: 3 reasons to excited about workstation

Finally, the Mac Pro feels like a ‘pro’ device again. [Leif Johnson](#) reports



Two years after Apple officially confirmed that it was working on a new Mac Pro, the machine finally made an appearance during WWDC’s keynote. And it didn’t disappoint.

You’ll find no ‘trash cans’ here. Instead, the new design riffs on the ‘cheese grater’ Mac Pros

that were so popular in the past decade. That's a strong signal to video editors and other content creators who need a lot of graphics and CPU power. The Mac Pro feels 'pro' again, and to complement that power, Apple also announced a new 32in Pro Display XDR that's a massive upgrade over the old Thunderbolt Display.

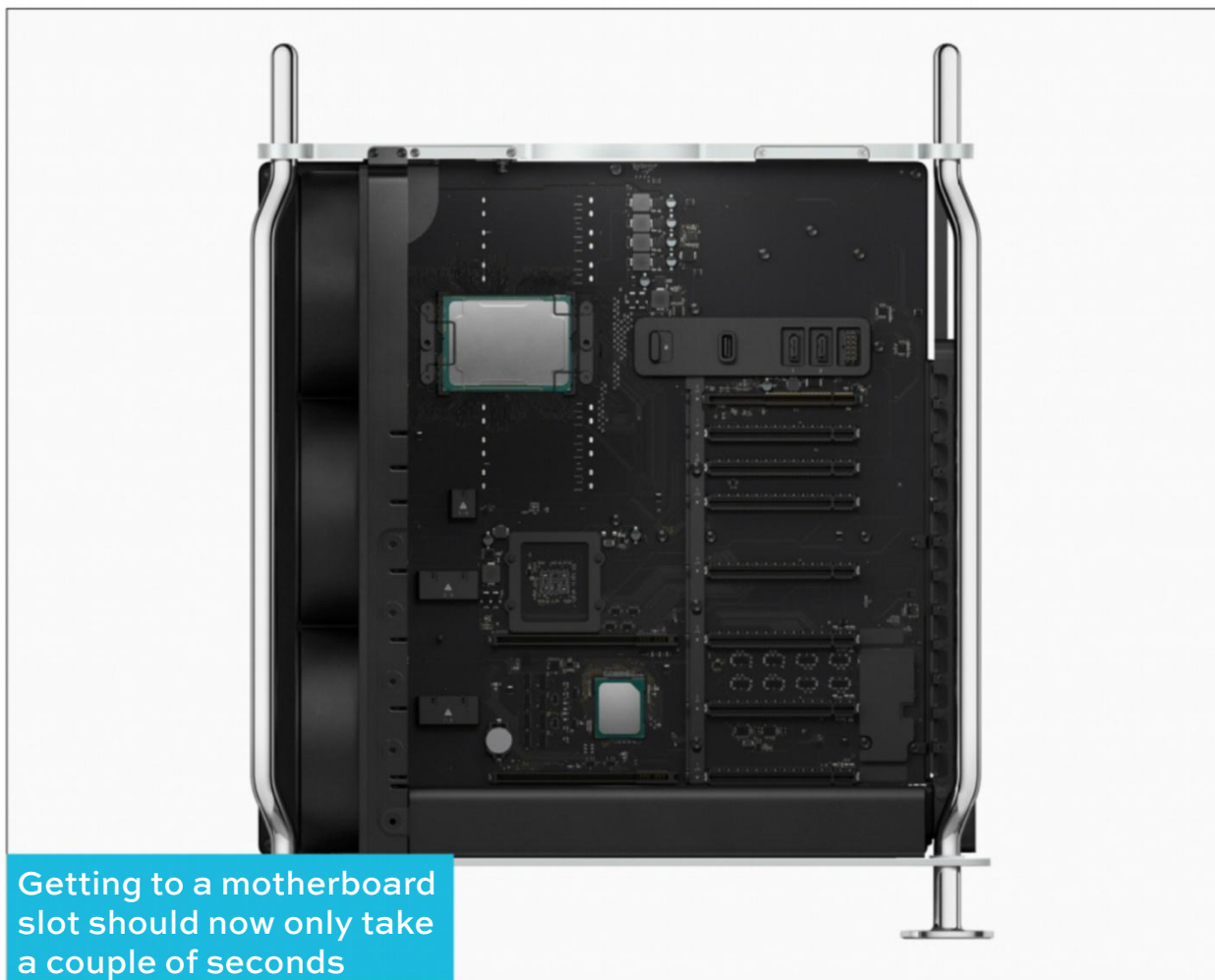
"It's incredible," Apple CEO Tim Cook said, and we're inclined to agree. Just watch out for an incredible price tag: for an entry-level price of \$5,999 [£tbc], you get 32GB of memory, 256GB of SSD storage, an 8-core Intel Xeon CPU, and a Radeon Pro 580X graphics card.

Obviously, if you push the Mac Pro to its utmost potential – 1.5TB of memory, Radeon Pro Vega II Duo and a 28-core Xeon – prices will be astronomical (you can see full specs but not pricing at fave.co/2K6Oxya). As for the Pro Display XDR, it starts at \$4,999 (£tbc). Both the computer and display are expected to hit stores sometime this autumn.

Now let's get into the three areas that most excite us in the new Mac Pro.

1. It's modular

One of the biggest complaints about the 2013 Mac Pro is that its small design essentially made it impossible to upgrade graphics cards and other components. But on stage at WWDC, Apple wasted no time showing how the new Mac Pro is upgradable. The machine has a 529x450x218mm stainless steel frame with an external case that can



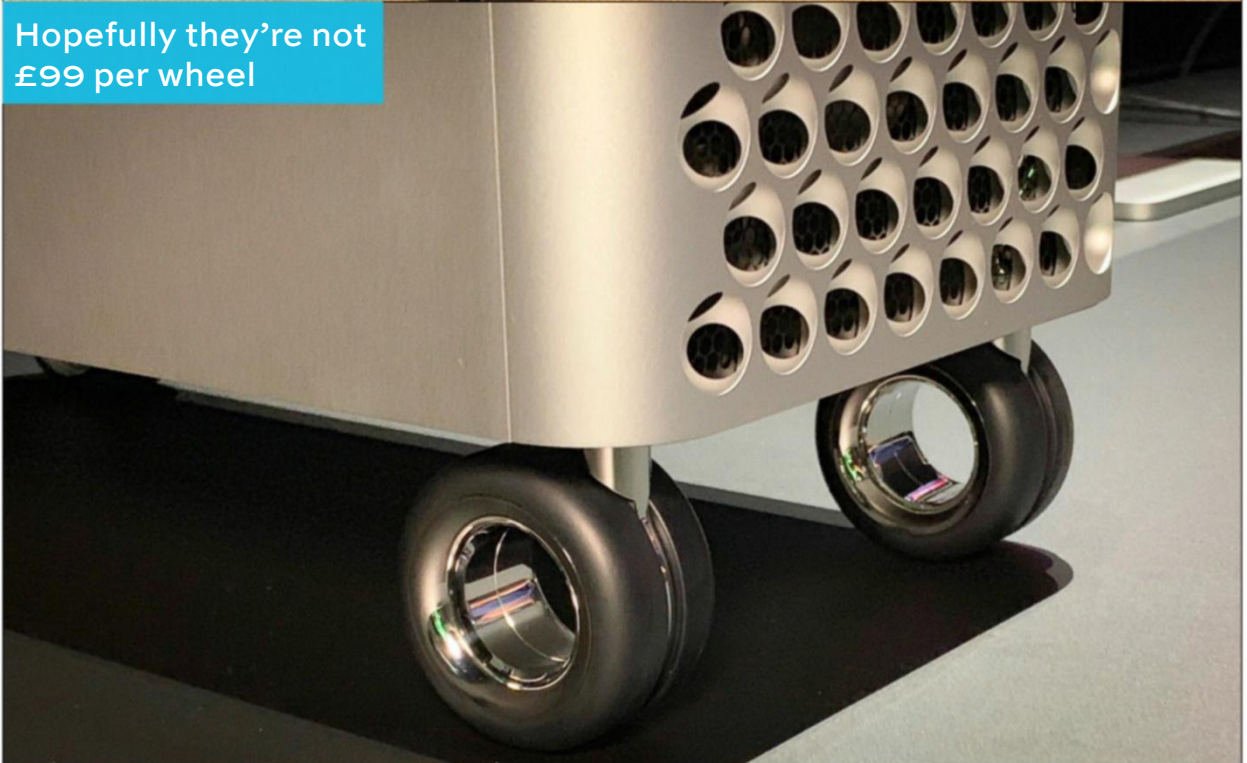
be easily lifted off with just a twist of a handle. In its base configuration, it weighs 18kg.

Apple is also embracing PCI expansion in a big way, as the new Mac Pro has four double-wide slots, and three single-width slots. Apple also has a half-width slot where it plugs in its own I/O card – it comes with two Thunderbolt 3 ports, two USB-A ports, and a 3.5mm audio jack. Apple keeps all this connected to its custom ‘MPX Module’ that comes with a dedicated heat sink. It also comes with separate ethernet ports.

Here's the new Mac Pro when it's been stripped to its skeleton



Hopefully they're not £99 per wheel

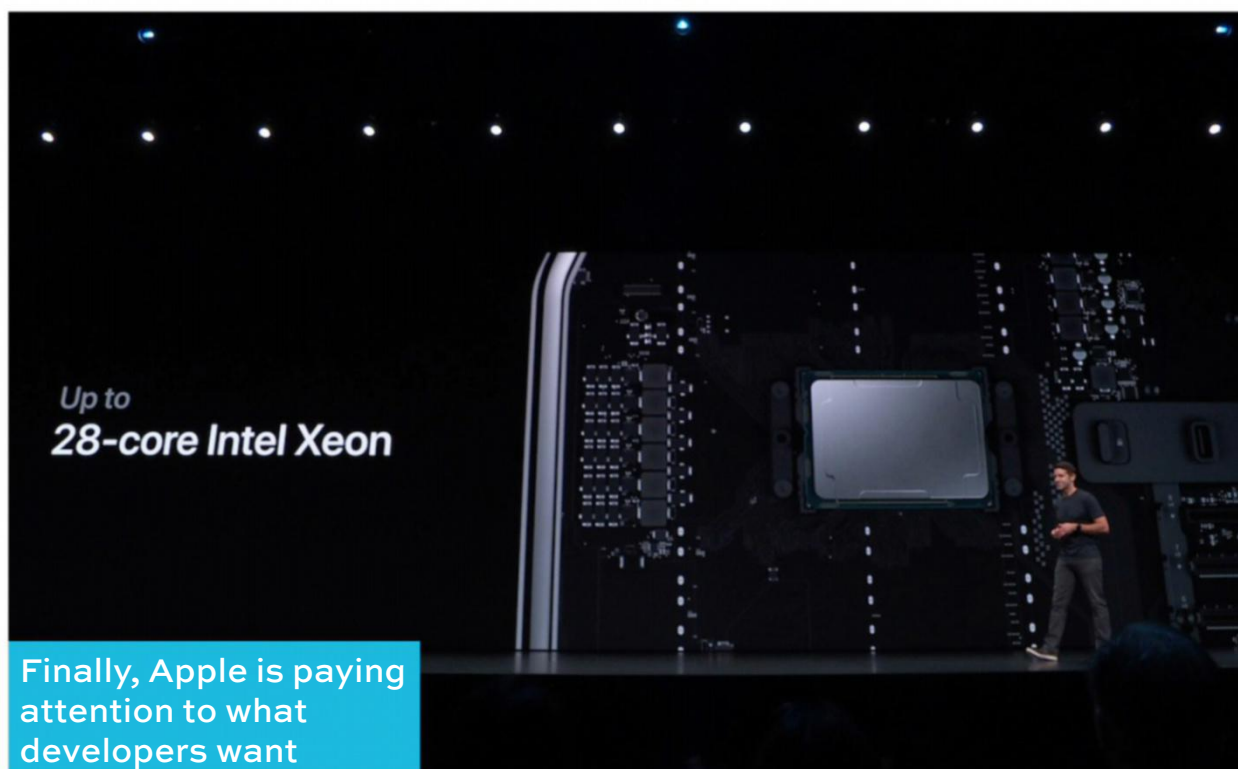


For a bit of extra modularity, you can even add wheels to the machine, allowing you to push the Mac Pro around your studio. The wheels, however, will be sold separately and their price is unknown.

2. It's powerful

In its max configuration, Apple's new Mac Pro is packed with an absolute beast of a 28-core Intel Xeon processor, and it can support a ridiculous 1.5TB of RAM.

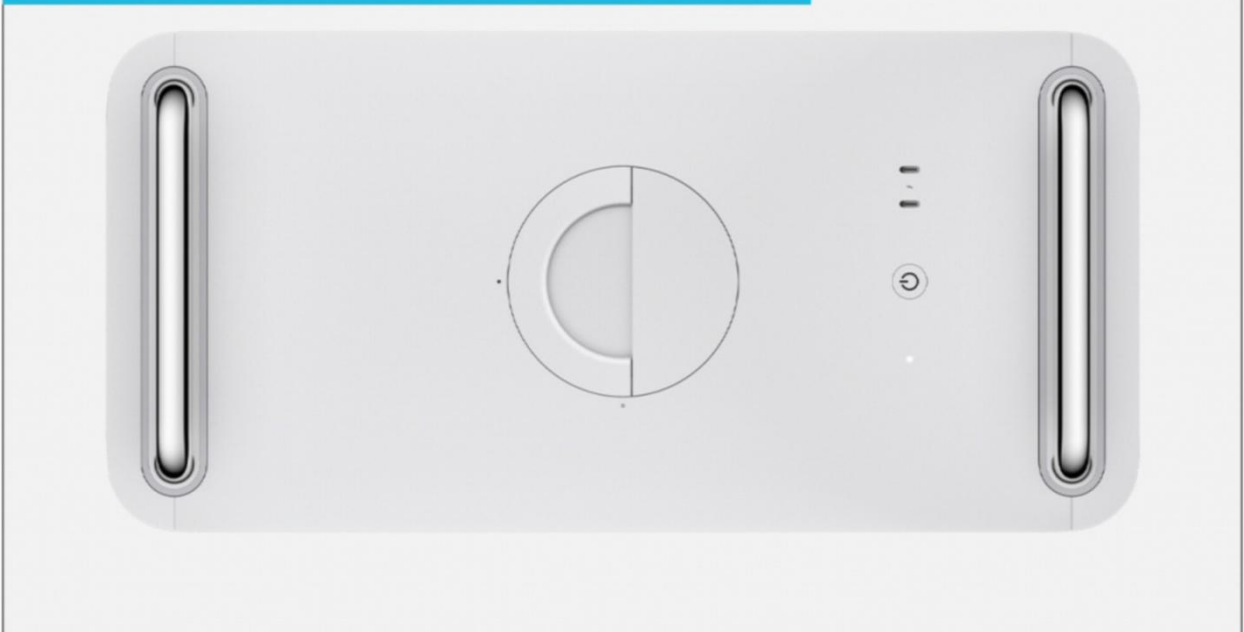
And if you need graphical power, the new Mac Pro can support up to four GPUs (via two Radeon Pro Vega II Duo cards), although the starting configuration comes with a merely decent AMD Radeon RX 580 with a single GPU. This is but one attempt in which Apple is trying to lure back video



Just in case
you forgot
who made it



The new Mac Pro is far more utilitarian than its predecessor, but Apple's trademark elegant design shows up even on the top of the case



editors who may have been scared away by the old ‘trash can’ model.

Another gift to content creators is the new Mac Pro’s custom (and optional) ‘Afterburner’ FPGA card, which can reportedly process six billion pixels per second. According to Apple, that will let the Mac Pro run three 8K RAW video streams at once, or 12 streams of 4K RAW video. It’s currently unclear if Apple designed Afterburner itself or worked with another manufacturer.

This is all powerful stuff, and required Apple to pack this machine with a 1.4KW power supply. And to keep everything cool, the Mac Pro will have three fans and a separate blower that’s supposedly no louder than the iMac Pro when running at full blast.

3. Apple made a 6K display go with it

As we long expected, Apple also announced a new display to go along with the new Mac Pro, although you can buy it separately if you wish. It’s called the Pro Display XDR – XDR stands for ‘Extreme Dynamic Range’ – and this beast of a monitor has a 32in LCD HDR display offering a resolution of 6,016x3,384, as well as 10-bit and P3 colour gamut capability. Its rear design references the ‘cheese grater’ design for the new Mac Pro itself (and doubles as a heat sink), and the display features nanotexture glass and anti-reflecting coating.

All this amounts to a display that’s 40 percent larger than what you’ll find on the 5K iMac. It can maintain a whopping 1,000 nits of brightness, but

Here's a stand that costs about as much as a low-end MacBook



it can reach up to 1,600 nits of brightness at peak. It connects to the Mac Pro itself with a Thunderbolt 3 cable, and Apple claims the new Mac Pro can support as many as six of the new displays. But, again, you'll have to pay at least \$4,999 (£tbc) for even a single display.

That 'at least' is important, as Apple doesn't even sell the Pro Display XDR with a stand out of the box. Indeed, the "Pro Stand", as Apple calls it, costs an extra \$999 (£tbc). It's a welcome improvement over 2013 Thunderbolt Display, though, as this stand supports tilt and height adjustments and even lets you rotate the Pro Display XDR into portrait mode.

Guide to macOS Catalina

Apple's next macOS is set to be called Catalina. We reveal its best new features. [Karen Haslam](#) reports



As we saw on [page 18](#), Apple has announced the details of the next version of macOS including its name – Catalina – and when it will be released – the autumn.

Project Catalyst

We'll start off with perhaps the most exciting piece of news for Mac users (and even more exciting for developers). Apple will be making it easier for developers to port iOS apps to the Mac. This is

great for developers since they won't need to spend time and money writing code for two different apps. Plus, it's good for Mac users because they will see an increase in apps available on the Mac platform.

By unifying the app development it is hoped that third-party Mac apps will be updated more frequently. Currently, most development funding goes to iOS apps.

Apple's new SDK (software development kit) currently allows developers to port their iPad apps to Macs. There will still be two separate apps, but developers will only have to write the underlying code once.

Catalyst is based in Xcode. All the developer will need to do is check the Mac box alongside iPhone and iPad, and Xcode will build in both cursor and windows control. This means that one development team can build the one app for iPhone, iPad and Mac.

While you won't be able to run iOS on your Mac, or macOS on your iPhone or iPad, you should be able to run most of the apps you use on each device – as long as the developer ports them over. The process of porting apps will be simplified, so developers will hopefully be willing to do so.

Project Sidecar

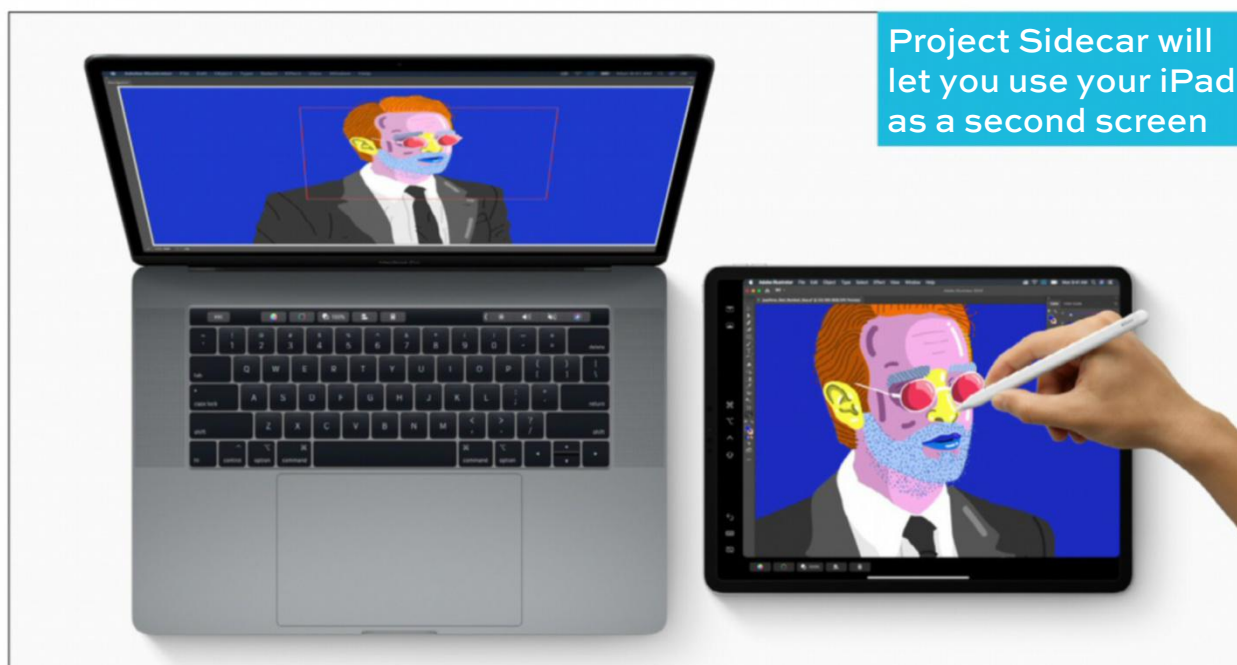
Use an iPad as a second screen

Users will be able to use their iPad alongside their Mac as a second screen. (The tablet will need to be running iOS 13 for this to work.) It will be possible to plug the iPad into the Mac, or connect it wirelessly

using Bluetooth and Continuity (the range is 10m). Both devices will need to be logged into the same iCloud account.

With the iPad connected to the Mac, you will be able to add a second screen on which you can extend your Mac's Desktop, or mirror your Mac's screen. You'll be able to use the mouse to drag windows over to the iPad's display, for example. You'll also be able to use an Apple Pencil to point and click and draw, for example when using Markup tools. And it will be possible to take advantage of the multi-touch gestures on the iPad and the new text editing gestures for that device.

This may be the closest we'll be getting to a touchscreen Mac (unless it convinces Apple that should be a thing.) When connected to your Mac this way you will be able to use any of your macOS apps on your iPad.



You won't be able to share the iPad's screen on the Mac display though, so it's not going to allow you to use iOS on your Mac.

Use an iPad as a graphics tablet

Creative users will also be able to use their iPad as a graphics tablet while using the apps listed below.

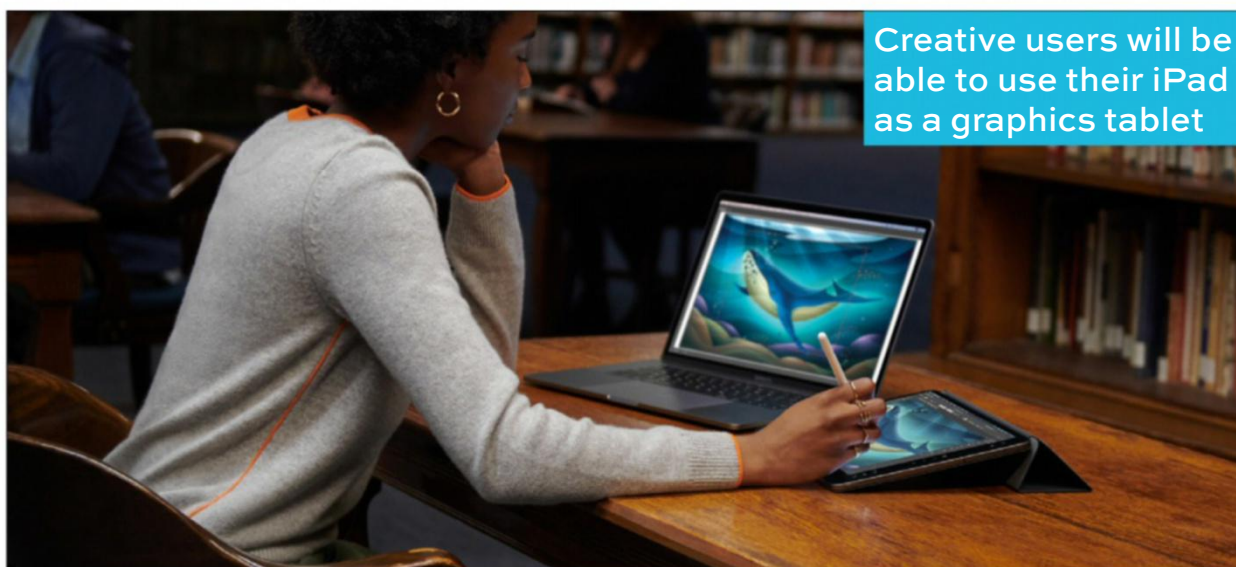
When an iPad is linked to a Mac using Sidecar it will gain a Sidebar, giving access to controls and shortcuts. You'll also get a sort of Touch Bar (as seen on the MacBook Pro) along the bottom of the iPad screen.

Compatible apps

Developers shouldn't have to do anything to add Sidecar support to their apps, it should just work, although they may want to build in some extra functionality to take advantage of the iPad's touchscreen and Apple Pencil.

Apple announced that the following apps already work with Sidecar:

- Adobe Illustrator
- Affinity Photo & Affinity Designer
- Cinema 4D
- Maya
- zBrush
- CorelDraw
- DaVinci Resolve
- Final Cut Pro
- Motion
- Painter



- Principle
- Sketch
- Substance Designer & Substance Painter

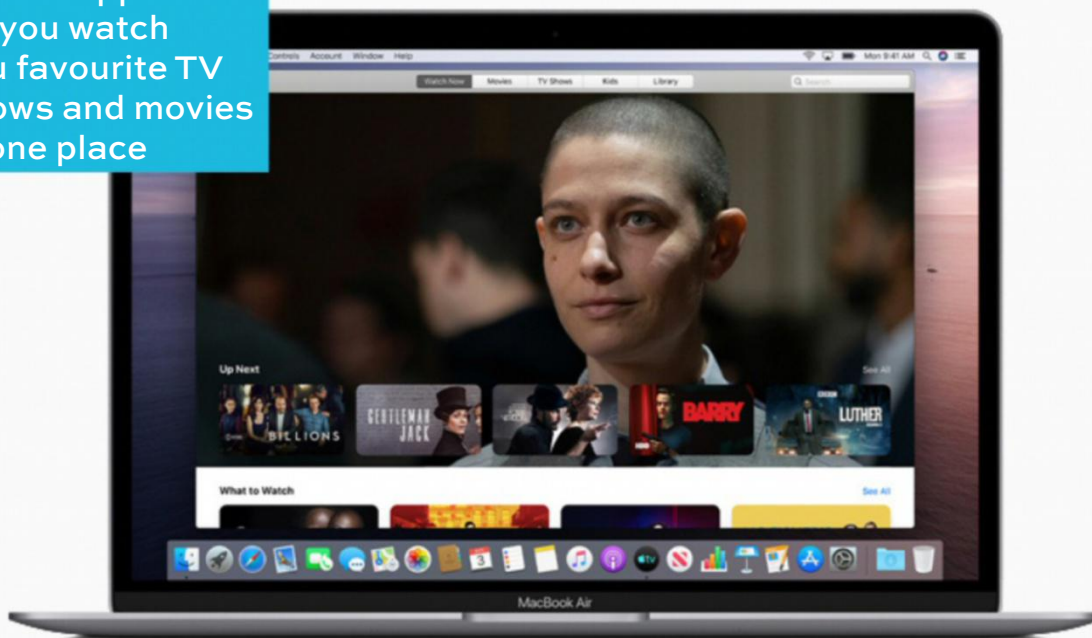
New and updated apps

As we saw on [page 18](#), Apple is finally getting rid of the cluttered iTunes app and instead offering three separate entertainment focused apps that will be familiar from iOS: Music, TV and Podcasts. Other apps getting a significant update include Photos, Safari, Mail, Reminders, and ScreenTime.

TV

When Apple put a spotlight on its plans to start streaming its own shows later this year, it also revealed that the TV app will arrive on the Mac this autumn. Currently, it is possible to watch movies bought or rented from the iTunes Store inside the iTunes app, but there is none of the functionality

The TV app will let you watch your favourite TV shows and movies in one place

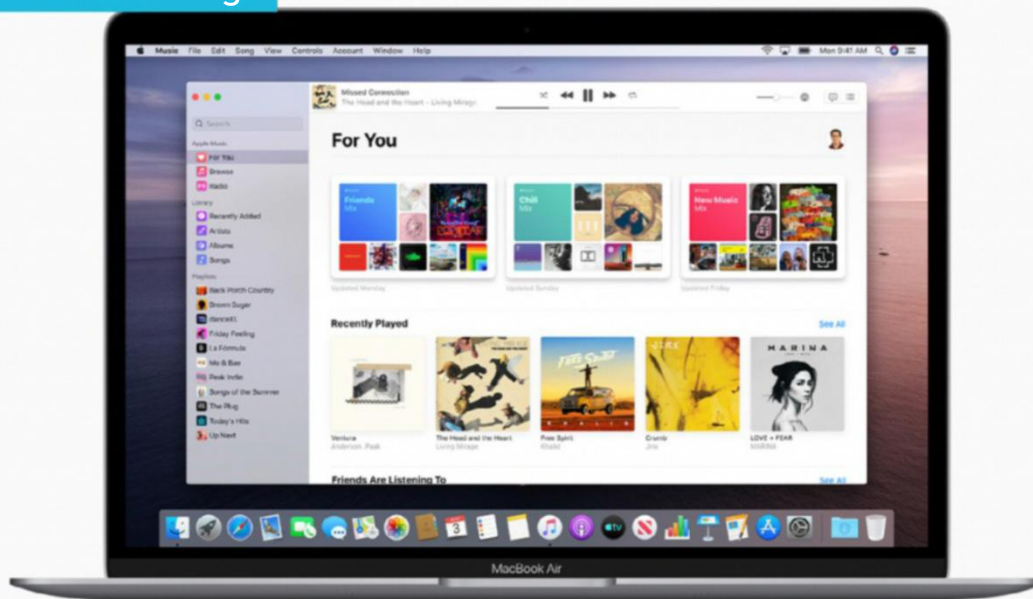


found in the TV app, including the way it integrates with other streaming services.

In Catalina, you'll be able to access everything you are watching on any of your Apple devices (or other devices that have the TV app) via Up Next, so you will be able to carry on from where you left off. There will also be recommendations in Watch Now based on your viewing habits and the opinions of Apple's team of editors. The TV app will also feature the Apple TV channels, so you won't need to install separate apps to watch your favourite shows.

You'll still have access to the 100,000 iTunes movies and TV shows to buy or rent, plus you will also gain access to all the content from Apple TV+. We don't yet know if there will be a subscription required for that service.

The redesigned app has a cleaner design



Music

It was no surprise when Apple announced its plan to break up the Mac version of iTunes – it's a bloated media management and jukebox app.

The new Music app will focus on music only, so it won't be as cluttered and complicated as iTunes. You will still have access to your music libraries and Apple Music subscribers will be able to listen to anything in Apple's extensive catalogue. The redesigned app has a cleaner design and is more colourful than iTunes currently.

A few other new Music features we like the sound of include:

- Read the lyrics as you listen to the song
- Better control over the music that will play next

There are over
700,000 podcasts
to choose from



- A miniplayer
- New search features that will make it easier to locate a song in your library

Podcast

According to Apple there are more than 700,000 shows in Apple's Podcast catalogue. When the new app launches it will have various new features to make finding these shows easier.

There will, for example, be new categories and curated collections put together by editors from around the world. There will also be a Trending section for popular shows and Top Charts.

Users will be able to search for content, such as a particular show, topic, guest, or host. In fact, Apple said the app will use machine learning to

WHAT IS AVAXHOME?

AVAXHOME-

the biggest Internet portal,
providing you various content:
brand new books, trending movies,
fresh magazines, hot games,
recent software, latest music releases.

Unlimited satisfaction one low price

Cheap constant access to piping hot media

Protect your downloadings from Big brother

Safer, than torrent-trackers

18 years of seamless operation and our users' satisfaction

All languages

Brand new content

One site



AVXLIVE **ICU**

AvaxHome - Your End Place

We have everything for all of your needs. Just open <https://avxlive.icu>

index spoken content of podcasts to enhance search. Once you have found a show, you can subscribe and be notified as soon as new episodes become available. You'll also be able to pick up from where you left off on another device – you'll find the episode you were listening to via the Listen Now tab.

Find My

The new Find My app will locate Apple devices even if they are offline by using Bluetooth to send signals which can be picked up by nearby devices. Its location can then be relayed back to you. This is encrypted and because it piggybacks on tiny bits of data it won't use up battery or impinge on your data allowance.

Screen Time and Parental Control

Screen Time – a feature that's already available on iOS – gives you an insight into how much time you spend in apps and online. You can use it to schedule time away from the Mac or to create Limits, so that certain apps can't be used outside of set periods. Combined Limits can be groups of apps, such as games or entertainment.

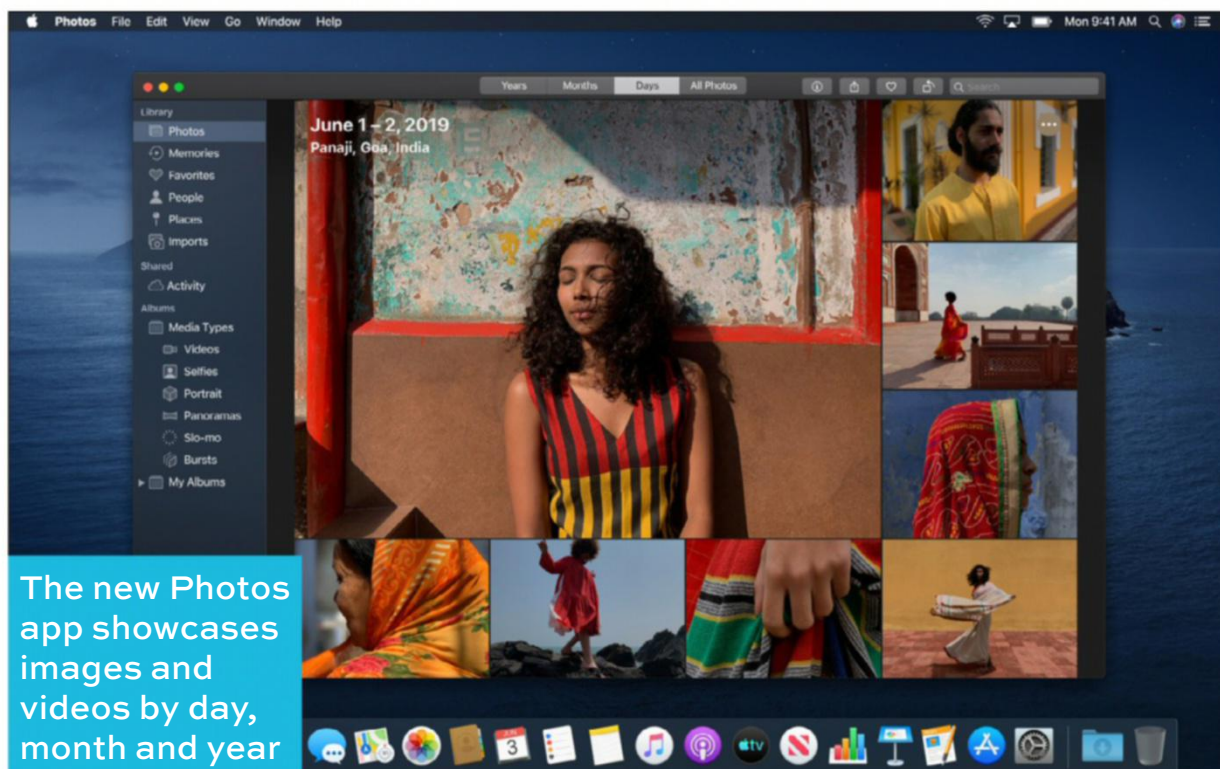
In Catalina you can also manage all your family's devices from Screen Time on your Mac, scheduling downtime, setting app limits and choosing which websites can be accessed on the different. You can also control who your children can communicate with via their devices by managing their contacts list – and crucially, you can choose that you can always reach them even during downtime.

Just before your time is up and a limit is about to kick in you will see a ‘One more minute’ warning, which will let you save what you were working on or log out before being kicked out of the app.

Photos

Currently, Photos can get a little cluttered, packed full of almost identical images in a tiny thumbnail format. The new version will introduce a new way to showcase photos and videos by day, month and year. Previews will be larger and the operating system will use AI to highlight photos from birthdays, holidays and anniversaries.

You’ll be able to browse your Photos by Day, Month and Year, as you can now, but the new format will better showcase images and video,



analysing images to show the best part of the image, you will also be able to zoom in to get a larger preview or choose whether to preview photos in square or original format. Video and Live photos will also autoplay.

Safari

The next version of Safari will have a new start page with Siri Suggestions based on frequently visited sites, bookmarks, iCloud tabs, Reading List selections and links sent in Messages. You will also start to see weak password warnings and suggestions of better passwords.

Another change: if you start to type the address of a website that you already have open in another tab, Safari will direct you to the already open tab. We're not sure how this will play out yet, as some people might want multiple pages open on a particular website.

Finally, you will be able to enable PiP (Picture in Picture) via the audio button on a Safari tab.

Mail

There are a number of new features in Mail that will help you stop your inbox from getting full with mailing lists and the like. For example, users will be able to block all emails from a specific sender and move all their messages to the trash. To access this feature, click on the sender's name in the email header. You will never need to unsubscribe again.

Speaking of which, if you do want to unsubscribe properly, the Unsubscribe link that usually appears

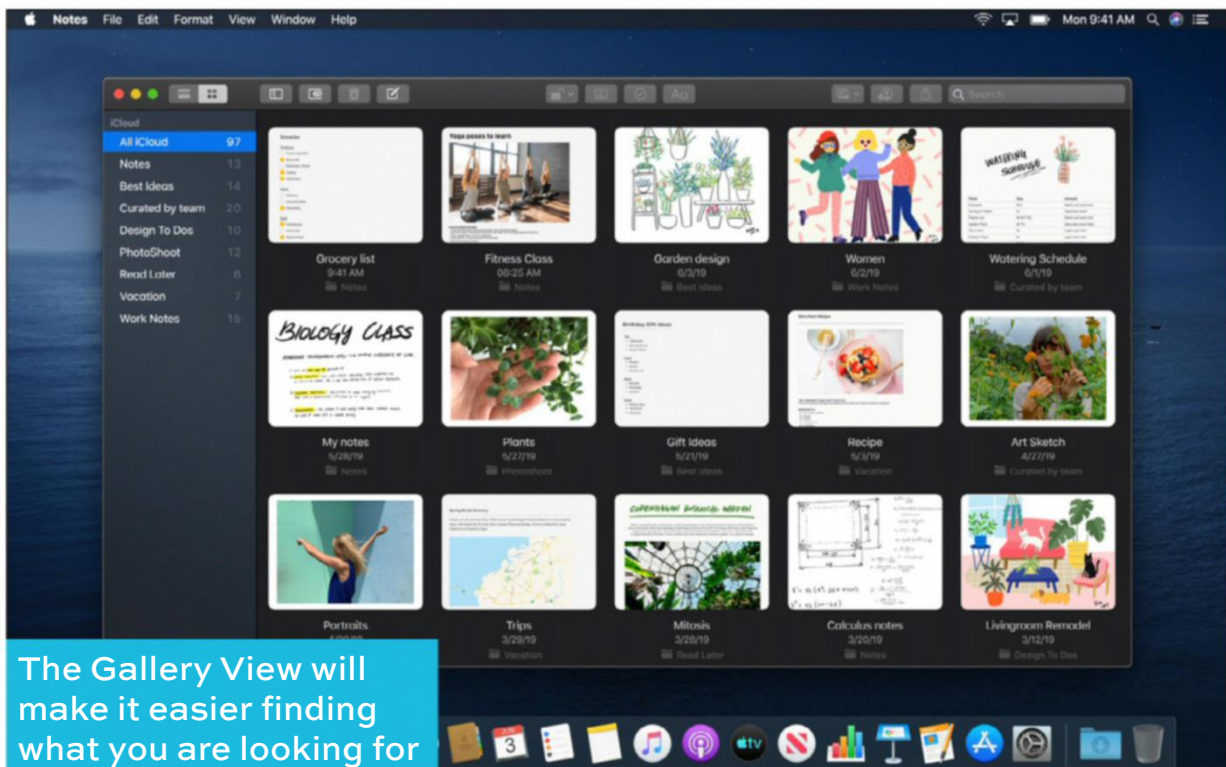
at the bottom of the email will be moved to above the email header, so you can unsubscribe easily.

Other new features include the ability to mute an overly active thread and stop being notified every time someone replies.

There will also be an update to Mail's layout, with a preview of the message on the right.

Notes

Notes has some changes that will make finding a particular note easier. You will see search suggestions, and the app will gain a new Gallery View that is designed to make it easier to see the note you are looking for. This view will show all your notes as visual thumbnails. We aren't sure how this will work since most of our notes are



random shopping lists, links to websites, and, well, notes, but it might encourage us to use Notes for other things.

For a few years now it's been possible to scan things on an iPhone using Notes. In Catalina Notes, you will be able to use optical character recognition to recognize the words and objects in images. Which should also help with search.

Apple has improved the app's collaboration options, including shared folders. And you will be able to share things as read only, so that they can't be edited. Finally, there will be a new checklist option that will move all your completed items to the bottom of the list, and an uncheck all option so you can use your list again.

Reminders

The Reminders interface is getting an overhaul, simplifying the creation and tracking of reminders. You'll be able to organize your upcoming reminders into categories such as today, scheduled, and all, and it will be possible to customise reminders with 12 colour and 60 symbols.

Other new features include a quick toolbar, so it will be easier and quicker to add a deadline, you'll be able to add attachments such as a website or a photo to a reminder, tag people in a reminder, and get an alert reminding you next time you are messaging them. You will also see Siri suggestions for reminders based on your messages, plus it will be possible to group a number of tasks under a top-level reminder.

QuickTime Player

We were worried QuickTime Player might not survive after Apple added video casting options to the Mac via Command + Shift + 5 in macOS Mojave. Prior to this QuickTime was the best way to record your screen. Now in Catalina, the app is getting a couple of new features.

The one that interests us the most: you'll be able to create an H.264, HEVC, or ProRes-encoded movie file by navigating to a folder of sequentially numbered images, then choosing your desired resolution, frame rate, and encoding quality. Other new features include PiP (picture in picture), so you can play video in a window that's not blocked by other windows, and the Movie Inspector pane will offer more information about a video.

Home

The Home app will work with HomeKit Secure Video, so you can view securely recorded video detected by HomeKit-enabled cameras on your Mac.

Other new features coming in Catalina

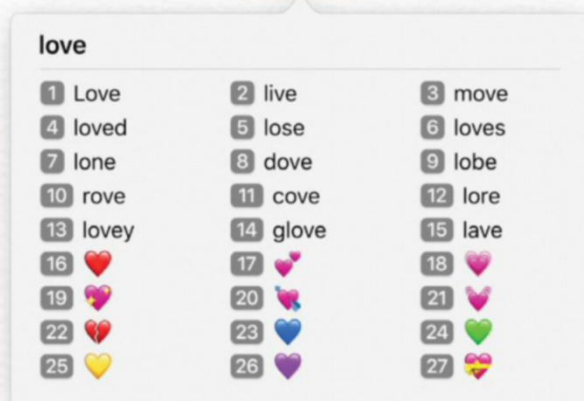
Accessibility & Voice Control

New Voice control features will make it possible to control a Mac entirely with your voice, which will be a benefit to those who can't use traditional input devices to control their Mac (the same voice control options will be available on iOS devices too).

Voice control uses Siri for speech recognition and includes enhanced text editing options that can be set to use your own custom words. Dictation is

Just your voice. It's a whole new way
everything you **love**. Like this

Voice Control lets you navigate an app by referring to numbered labels that appear next to clickable items



simplified, so, for example, you could say “Replace ‘I’m almost there’ with ‘I’ve arrived’”, or you could say “change almost” and you would see a list of suggested replacements, including emoji.

To make controlling the Mac with your voice simple, you’ll be able to navigate an app by referring to numbered labels that appear next to clickable items, or by referring to points on a grid that can help to pinpoint particular locations on the screen.

Other new accessibility features include the ability to zoom in on text by hovering over it and pressing the Control key. It will also be possible to choose from new colour filter options that could make the screen easier to read.

Apple ID

There will be some changes to the way you can access your apple account via your Mac. You’ll

be able to get to your Apple ID info via System Preferences to gain access to account details, security details, payment and shipping info, and more. You can, of course, review and update iCloud settings, manage or upgrade your storage plan, and view your subscriptions (and those being shared via Family Sharing). In addition you'll see a list of all the devices that are signed into your account, including when they were last backed up and their Find My status.

Security

Apple has a number of security measures built into macOS. One of these is Gatekeeper, and in Catalina it will gain the ability to check apps for known security issues when you install them and periodically after. Other new features include:

- Apps will be required to get permission before accessing a user's Documents and Desktop folders, iCloud and external volumes, folders of third-party cloud storage providers, removable media, and external volumes.
- Mac users will be prompted before an app captures keyboard activity or takes a screenshot or video of the screen.
- There will be a dedicated system volume completely separate from all the other data on the Mac, so it will not be possible to overwrite system files.
- Hardware peripherals previously ran code in macOS using kernel extensions, in Catalina will

run separately from the OS, so they can't affect macOS if something goes wrong.

Compatibility

For a few years now Apple has been warning that support for 32-bit apps on the Mac would be ending. Mojave was the last macOS release to support 32-bit apps. Only applications that are 64-bit will run in the next version of macOS. To check your Mac, go to Apple Menu, About This Mac, System Report and Software > Applications. Look in the final column to see whether it's a 64-bit application.

Here are some of the non-64-bit applications that may be a cause for concern:

The screenshot shows the 'Software' section of the System Report window on an iMac. A table lists various applications with their names and versions. The 'Adobe Device Central CS5' application is highlighted, and its details are expanded below. A red box highlights the '64-Bit (Intel): No' status, indicating it is a 32-bit application.

Application Name	Version
Adobe AIR Updater	2.7
Adobe Application Manager	10.0.0.49
Adobe Application Updater	4.8.1.435
Adobe Bridge CC 2018	8.1.0.383
Adobe Bridge CS5	4.0.5.11
Adobe Bridge CS6	5.0.2.4
Adobe CEF Helper	4.8.1.435
Adobe CEF Helper EH	4.8.1.435
Adobe CEF Helper NP	4.8.1.435
Adobe Desktop Service	4.8.1.435
Adobe Device Central CS5	3.0.1.0.3027
Adobe Download Assistant	1.2.2

Adobe Device Central CS5:

Version: 3.0.1.0.3027
 Obtained from: Unknown
 Last Modified: 01/03/2011, 17:01
 Kind: Intel
 64-Bit (Intel): No
 Location: /Applications/Adobe Device Central CS5/Adobe Device Central CS5.app
 Get Info String: 3.0.1.0, Copyright © 2007-2010 Adobe Systems Inc.

You can check whether an app is 32- or 64-bit via System Report

- Adobe Illustrator CS5
- Adobe Illustrator CC (2017)
- Adobe InDesign CS5
- Adobe Photoshop CS4
- Microsoft Excel 2011
- Microsoft PowerPoint 2011
- Microsoft Outlook 2011
- Microsoft Word 2011

Support for Office 2011 for Mac ended on 10 October 2017. Even if you are running Office 2016 for Mac you should update to version 15.35 or later.

There are also some Apple apps that no longer work. Apple used to bundle a number of apps with Final Cut Studio and Logic Studio, both of which are now discontinued and replaced by Final Cut Pro X and Logic Pro X in 2011. If you are still using these older suites note that none of these bundled apps, which included DVD Studio Pro, Soundtrack Pro, Colour, Cinema Tools, and more, will work.

System requirements

- MacBook models from early 2015 or later
- MacBook Air models from mid-2012 or later
- MacBook Pro models from mid-2012 or later
- Mac mini models from late 2012 or later
- iMac models from late 2012 or later
- iMac Pro (all models)
- Mac Pro models from late 2013

iTunes changes on macOS 10.15 Catalina

Not dead, but a whole lot different. [Michael Simon](#) reports



You might have read a headline or 30 recently proclaiming the death of iTunes. It certainly seemed like that was the case; during the WWDC19 keynote, Apple VP Craig Federighi skewered the long-time media app for doing too much and announced it was breaking up into separate TV and Music apps. Short of holding an iOS 9-style funeral, Apple eliminated the iTunes app from the Mac and shuffled its functionality to new apps and menus.

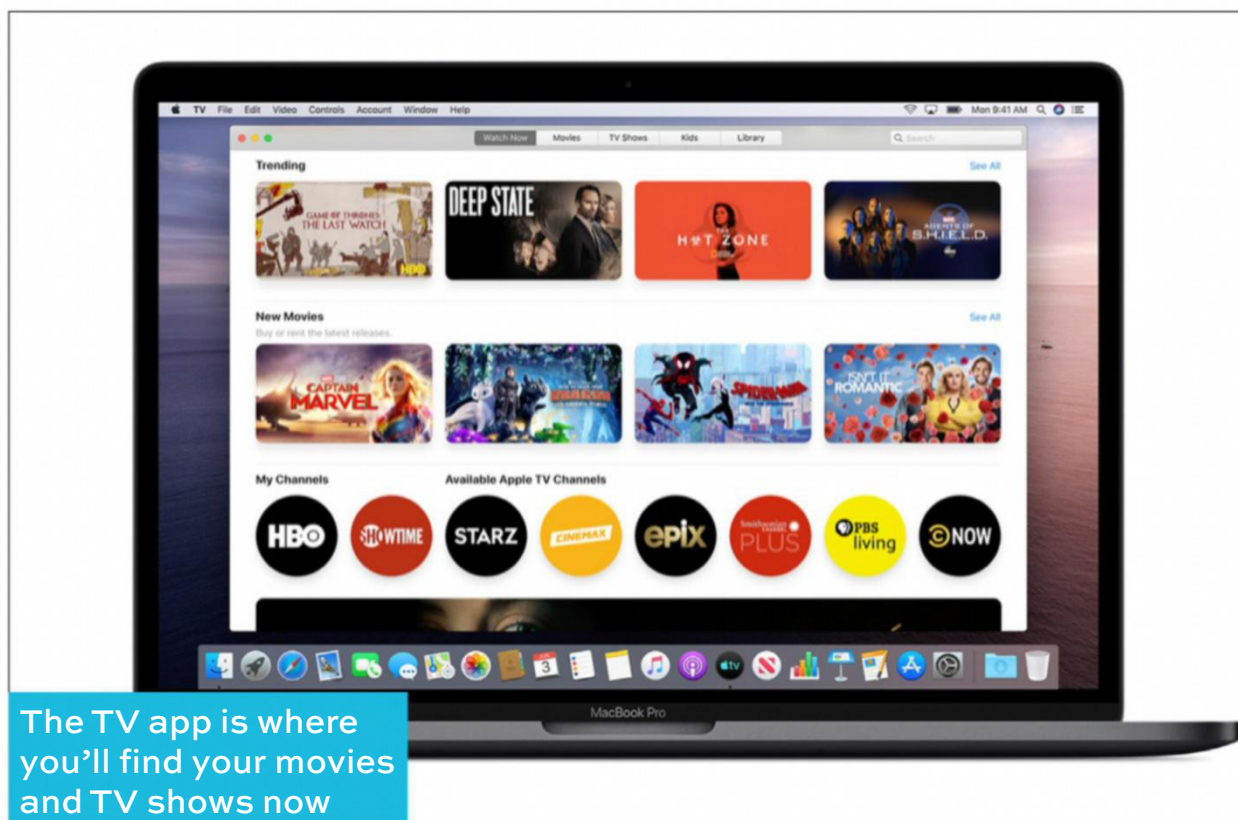
How does it all work? And is iTunes really dead? Get the answers to those and any other question you may have over the following pages.

Is iTunes really gone?

Yes, the app named iTunes that we've been using on our Mac for nearly two decades is no more. When you upgrade to macOS 10.15 Catalina, you won't find an iTunes app anywhere.

Where did all my stuff go?

In place of iTunes will be new apps: Music, Podcasts, and TV. If they sound familiar, it's because you've seen them everywhere but your Mac: iPhone, iPad, and Apple TV. Apple is bringing



them to the Mac. Now your entire purchases and ripped music library and playlists will be in Music, and your Movies and TV Shows libraries will be in TV. Podcasts will be in Podcasts. And audiobooks will move over to the existing Books app.

Do I need to do anything to transfer my libraries?

You shouldn't. MacOS Catalina will do all of the heavy lifting to migrate your libraries to the appropriate places.

Will I still be able to rip songs off a CD?

All of the things you did before in iTunes should work just fine in the new Music app, including iTunes Match and purchases, as well as any new or old ripped CDs.

How do I buy new stuff now?

Here's where it gets a little confusing. While purchases are carried out in the appropriate app (music in Music, movies and TV shows in TV, and audiobooks in Books), the purchase process is a bit different. The TV app has separate Movies and TV Shows tabs at the top of the screen that will function much like iTunes does now, spotlighting deals and new content, and letting you browse through the entire catalogue. When you want to buy or rent something, click the buy link and it'll be transferred to your library. The same goes for

Music is a little different. Since Apple offers a streaming service, that takes Centre stage, with

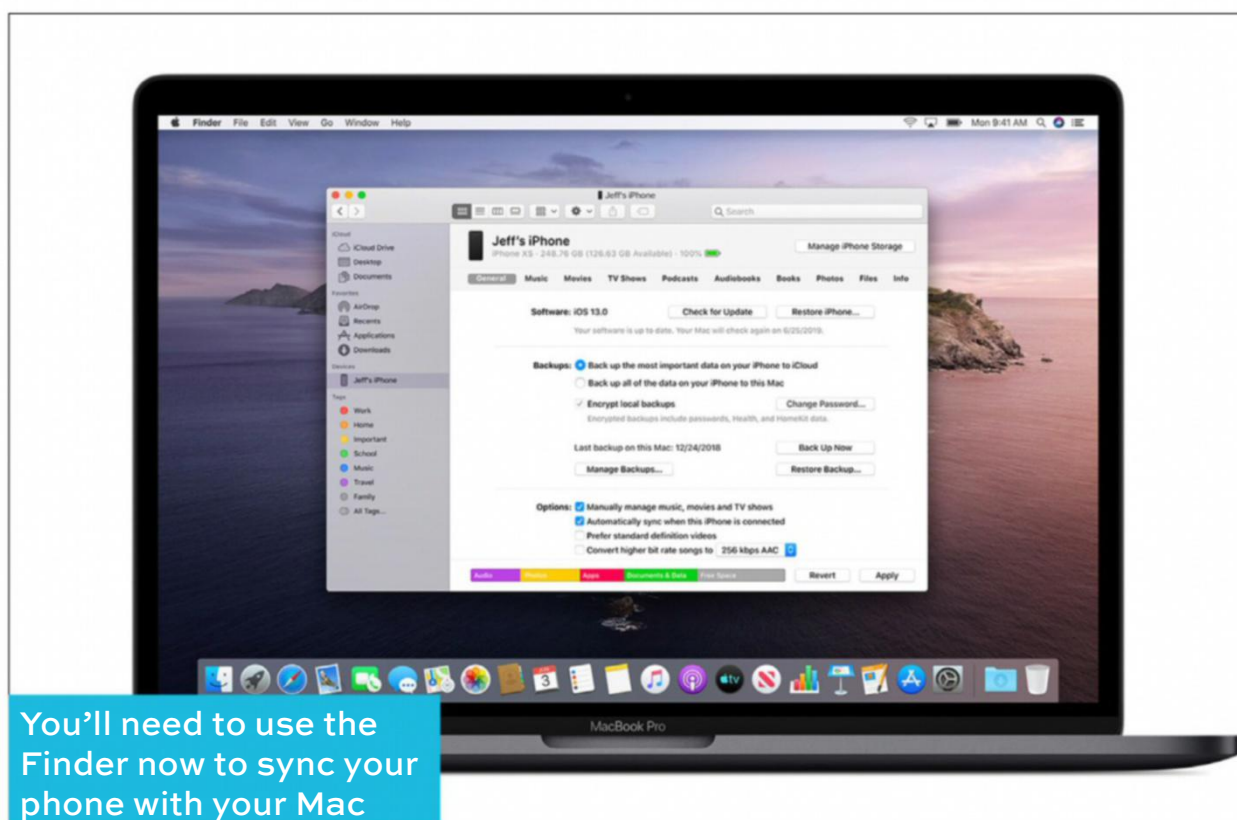
everything else populating a sidebar like the current iTunes app. Inside there you'll find an old friend: the iTunes Store. Click on it and you'll be find a store that looks a lot like the current one.

Wait, so iTunes isn't dead then?

Well, iTunes is, but the iTunes Store isn't. It's just returning to what it was before Apple started selling other kinds of media.

What if I'm an Apple Music subscriber?

Apple Music subscribers will find everything in the Music app, of course. They'll also still see the iTunes Store option in the sidebar, but they can opt to hide it if they'd like.



How do I manage my iTunes account?

Managing your iTunes account works pretty much the same way as it does now. Each of the media apps will have an ‘Account’ menu in the top bar, where you’ll find the usual options: Authorizations, Sign Out, and so on. Click on View My Account and you’ll be taken to your usual account page, where you can update your credit card info and address, and see your purchases.

How do I manage my subscriptions?

Subscriptions are currently handled inside your Account page in the Mac App Store, so that shouldn’t change.

Will be iTunes gift cards still work?

Yes! Apple says that iTunes Gift Cards and iTunes credits “will be maintained and can be used with the new apps and the App Store” as before. So it appears that Apple will continue to sell iTunes gift cards for the foreseeable future.

How do I sync my iPhone or iPad to my Mac for backups?

If you use your Mac for iTunes backups, you’ll no longer need to launch an app to when you plug in your iPhone or iPad. Instead, your device will appear in a new sidebar item in Finder windows, which will contain all of your previous backups and sync settings as before. Apple also says it will now be “easier to drag and drop files you want to transfer” since you’ll already be inside the Finder.

What if I don't (or can't) update my Mac to Catalina?

Apple is billing the new media apps as a Catalina feature, so presumably older Macs will stick with iTunes for the foreseeable future. It's possible that Apple sends out a future update to older version of macOS that deprecates iTunes, but that hasn't been announced

iOS 13 features Apple didn't announce at WWDC

There's a lot more than Dark Mode. [Michael Simon](#) reports



We heard a lot about iOS 13 on the main WWDC stage, but with so many other announcements to get through, there was only so many things that Craig Federighi could show us directly. However, Apple briefly showed a slide with a few dozen new iOS 13 features that are coming in the autumn – and we poured through the list so you wouldn't have to.

Apps

Maps: Improved report a problem

Maps: Place Card enhancements

- Safari:** Siri suggestions
- Safari:** Updated start page
- Safari:** Enhanced anti-fingerprinting protections
- Notes:** View-only collaboration
- Notes:** Folder management
- Notes:** More powerful search
- Notes:** New checklist options
- Mail:** Block sender
- Mail:** Mute thread
- Reminders:** Customize appearance of lists
- Contacts:** New relationship labels
- Contacts:** Add attachments to events
- Photos:** Search enhancements
- Photos:** Location controls for sharing
- Messages:** Improved search
- Messages:** Business Chat suggestions
- Podcasts:** Siri suggestions
- Books:** Reading goals
- Apple News+:** Available in UK and Australia
- Home:** Refreshed accessory controls

Dual SIM support

- FaceTime
- iMessage
- Simultaneous phone calls

Connectivity

- Wi-Fi selection in Control Centre
- Low Data Mode
- Data separation for BYOD
- Bluetooth wireless splitter
- Option to download large apps over cellular

CarPlay

- Irregular screen size support
- Light mode
- Independent app views
- Adjustable screen size support
- Do Not Disturb while Driving
- Second video stream support

Siri

- Hey Siri support in CarPlay
- Siri Shortcuts in Home automations
- Siri Event Suggestions from third-party apps
- Conversational Siri Shortcuts

UI Enhancements

- Separate emoji and globe keys
- Optimized battery charging

Audio

- Airplay 2 speakers in Home automations
- Dolby Atmos playback

Languages

- Typing predictions for Vietnamese
- Typing predictions for Hindi
- Typing predictions for Swedish
- Typing predictions for Dutch
- Typing predictions for Cantonese
- Typing predictions for Arabic
- Enhanced language setup
- Hindi and English bilingual support
- New Indian language system fonts

- Thai-English bilingual dictionary
- Vietnamese-English bilingual dictionary
- Support for all 22 official Indian languages
- Language selection per app
- Indian English voices
- Adjustable Chinese handwriting keyboard height

Miscellaneous

- Single sign-on extension
- Enhanced QR code scanning
- Managed Apple IDs for business
- Silence unknown callers
- Video downloads optimized for congestion in India
- Weak password warnings
- Modern authentication for device enrolment
- Auto Detection for Do Not Disturb While Driving

With iPadOS, Apple's dream of replacing laptops finally looks like a reality

With iPadOS, you can feel better about leaving the MacBook behind. [Leif Johnson](#) reports



As recently as last month we could still look at the iPad and smirk at Apple's dogged insistence that its tablet works as a laptop replacement – one that will even leave us asking questions like, “What’s a computer?” The power was certainly there – especially in latter-day models – but not the freedom.

I know this all too well. For over a year I used an iPad as my main work device, but I crawled back to the Mac after enduring months of unusable thumb drives at press trips and frustrations springing from actions as simple as selecting text. At WWDC, though, Apple dashed away most of my concerns with a masterstroke that it's calling iPadOS.

Currently, the Mac Pro is stealing much of iPadOS's thunder, but months from now I believe we'll find that Apple's 'new' operating system left the bigger impact. Granted, I haven't had a chance to handle iPadOS just yet, but everything I've seen so far suggests it'll transform the iPad into the laptop replacement Apple has always wanted it to be, even while retaining – no, improving – the features that set it apart from devices like Microsoft's Surface tablet.

I'm willing to entertain the idea that these changes make it a better buy than a MacBook for some professionals. Oh, you can find some people who claim they already feel that way – that it's just suited to a different type of workflow – but their defences tend to sag under the weight of excuses. With the changes, though, even I'm looking forward to leaving my MacBook Pro behind for a change in favour of taking just my tablet, its keyboard case, and the ever-so-portable Magic Mouse.

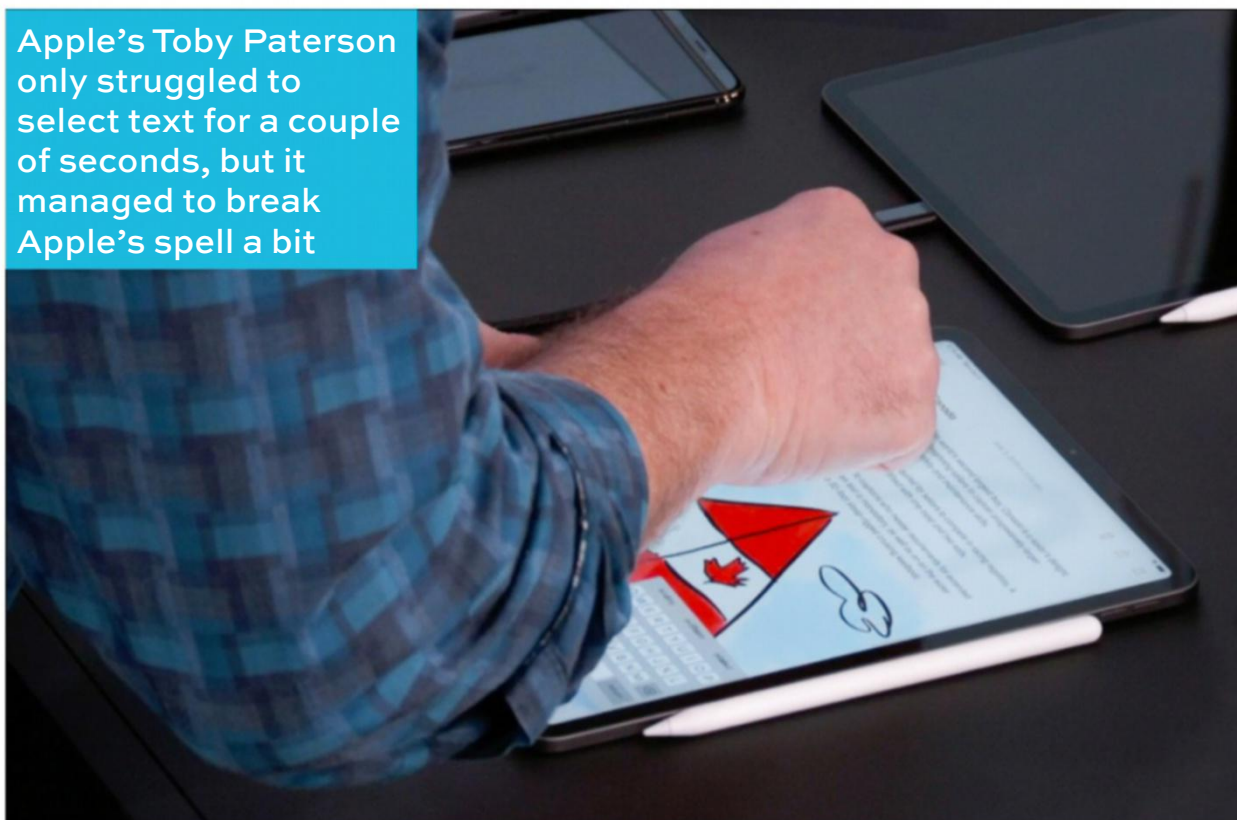
Free from its bonds

With iPadOS, there's far less of a need to make excuses. Apple eliminated many of the frustrations that have dogged the tablet's standing as a true

work device for years. The biggest one wasn't even mentioned in Apple's keynote. Instead, it was found lurking under Accessibility in the Settings app by developer Steve Troughton-Smith. At last, he found, the iPad Pro now comes with mouse support with a feature Apple is calling "Assistive Touch". You'll have to deal with a hideous cursor, but hey, you can use both USB and Bluetooth mice ranging from the Magic Mouse and Magic Trackpad to fancier peripherals such as the Logitech G502.

That alone is enough to make it a laptop replacement for many. Nothing slowed down my old iPad workflow quite so much as the need to hold my finger down on text to select it. The process takes a lot longer than it would with a mouse, and even

Apple's Toby Paterson only struggled to select text for a couple of seconds, but it managed to break Apple's spell a bit



Apple's Toby Paterson inadvertently demonstrated its fiddly nature when he struggled to select a word on an iPad for several seconds during WWDC's keynote. At the very least, it allows us to work without our hands or arms blocking the screen.

It's enough to make the iPad feel more like a Mac. I've often wondered if Apple hadn't brought features such as mouse support to the iPad because it was worried about killing off the non-professional MacBook user base. If so, actions like this prove that it's no longer worried or that it feels these concerns are no longer relevant.

Take the new home screen interface, which now looks more like a traditional desktop. Apple squashed all those huge spaces in-between apps,



for one, which means you'll be able to cram all your essential apps on the new screen. But Apple also lets you keep widgets in view on the home screen as well, and so lets you see what's next on your calendar without swiping over to a different screen.

It also acts more like a traditional laptop. You can now use USB memory sticks with an iPad, and you can import data from those drives directly into the Files app. It's the logical extension of the new iPads Pros' ability to import data directly from digital cameras through their USB-C port, although with iOS 12 you can only import photos (and then you could only import them to the Photos app). Now, though, you can use these files with all kinds of apps.

Apple even paid attention to the little details as it improved the Files app, so that it now supports a Column view with detailed information about specific files. You'll also get options for sharing files or saving them as PDFs, and you can share entire folders with both other iOS users and even PC users. We can also finally use Safari on the iPad exclusively in 'desktop' mode, which eliminates frustrations while trying to work with interfaces that hide key elements when working on the mobile version of a site. According to Apple, this will even work with the highly complex, multi-featured web versions of services such as Google Docs.

A nice extra touch that shows that Apple is committed to helping its users get the most out of their devices, you'll also be able to use your iPad as a second display for your Mac and as a stand-in Wacom tablet once macOS Catalina drops.

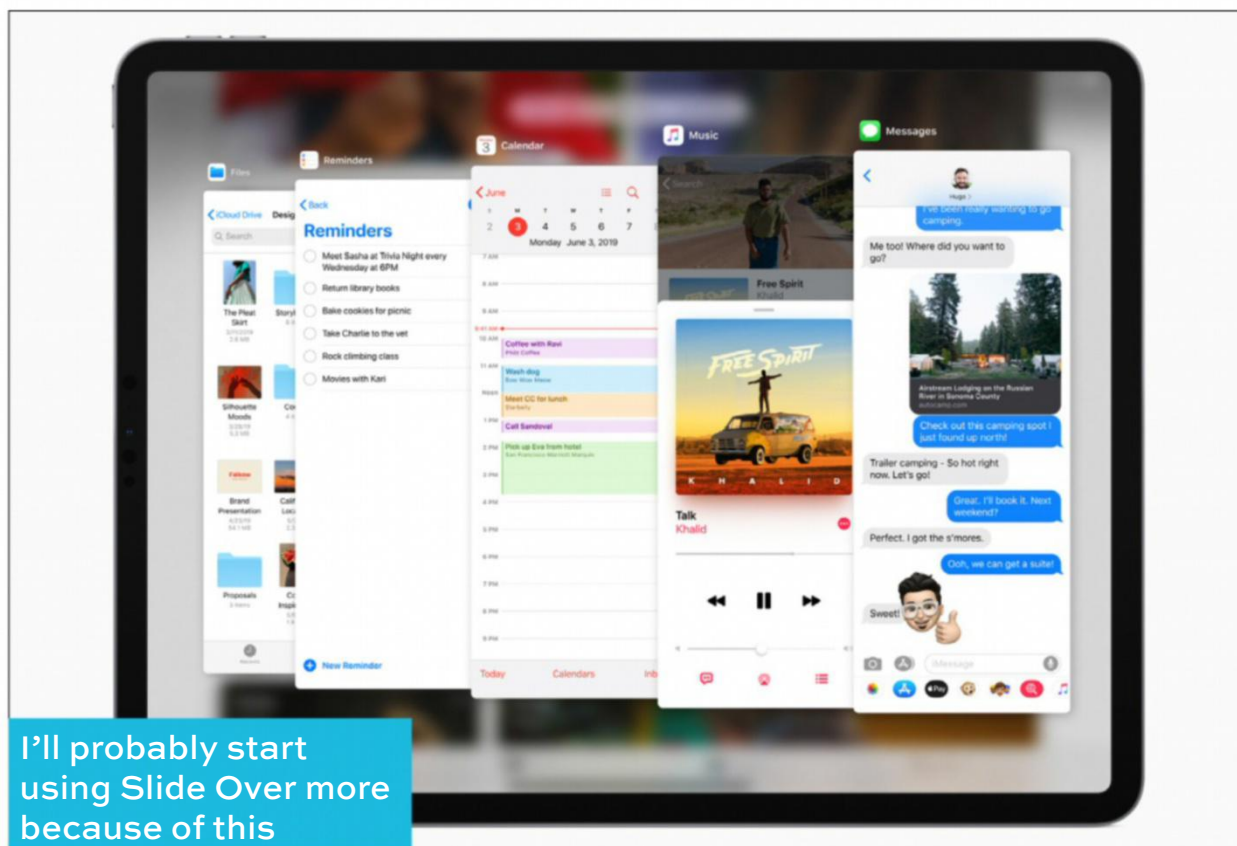
Making good things better

Most of those features have been on the Mac for years, but it'd be a gross oversimplification to dismiss iPadOS as a way of porting macOS to a tablet. iPadOS greatly improves the iPad without sacrificing its identity. Even though Apple removed a lot of the iPad's frustrations by giving them Mac-like designs, it also strengthened some of its tablet's signature features.

We can especially see this in the changes to Split-View multitasking. As a journalist, I've long found Split View helpful because it lets me keep my draft open in one window while I keep my reference document open in another. Unfortunately, I always had to effectively redo the Split View setup when I wanted to look at something from another document or app.

Now, though, Apple lets us have multiple Split View windows, all of which are browsable through Exposé. To expand on my example, that means I could open one Split View window in which I pair a writing app such as iA Writer with Safari while opening another in which I pair iA Writer with a PDF document. This particular setup also works because Apple finally lets us use documents from the same app for both windows.

Similar changes appear in the iPad's related Slide Over windows, which hover on the right or left sides of the screen when you don't want to force the display into Split View. With iPadOS, you can access multiple Slide Over windows through an interface that's reminiscent of the app switcher on



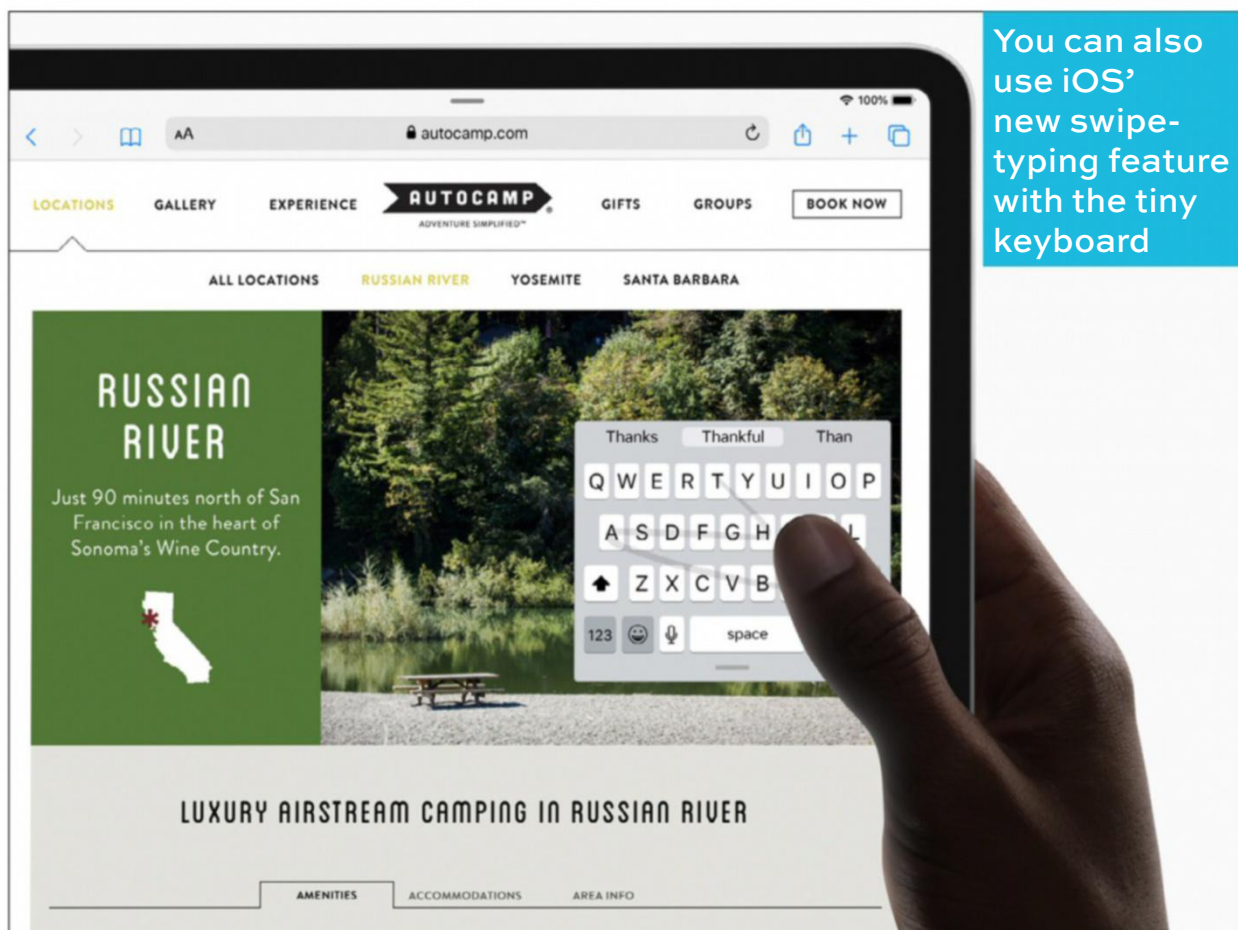
the iPhone, and you easily swipe between them with the help of a bar along the bottom of their windows.

Here's a caveat: a lot of its effectiveness will depend on support from third-party developers. Plenty of apps support Split View, of course, but the widely used Google Docs famously didn't add the feature for months after it had already appeared on virtually every other writing app on the App Store.

Apple also maintains the iPad's identity by making improvements to interactions when you're holding it like a notepad. At its simplest, it lets you access a small sidescreen keyboard that works a lot like the one-handed keyboards on devices like the iPhone XS Max. It's a good workaround for the

common long-existing problem of having too big of a keyboard to type on when your other hand is busy holding the tablet itself.

Apple also announced improvements for the Apple Pencil that emphasize its utility outside the usual focus on drawing. For instance, you can trigger Markup at any time by swiping up with the Pencil from a corner of the display, which will then produce an editable screenshot. That makes it even more useful for adding annotations to photos, emails, or even web pages, especially now that Markup can capture a web page's or document's entire content rather than just the immediately



visible screen. Convenience informs many of the new changes, right down to the ability to move the colour palette for the Pencil around on the Notes screen.

The Pencil will probably even write better, as Apple improved the latency from 20ms all the way down to 9ms. Hopefully that will make it write more like a regular pen or pencil, which should improve the likelihood that professionals will use the Pencils for taking handwritten notes rather than simple tasks like highlighting.

Finally, for all my excitement about the hush-hush mouse support, I'm happy to report that Apple also didn't neglect the touch controls. With iPadOS, you can select whole swathes of text just by swiping your finger over them, which would have been a godsend for my workflow a few years ago. Moving the cursor works much the same, and additional three-finger gestures allow you to cut and paste. Federighi made it look easy (by showing the feature through a video on stage), but Toby Paterson's struggle with word selection a few minutes later makes me wonder how well it will work in practice.

More than padding

The upshot of all this is that iPadOS will significantly change how we use our iPads in the coming years. It's now got the interface as well as the power to support people who want to use it with 'pro' apps like the upcoming full release of Adobe Photoshop. It's a massive leap forward, and it came faster than I expected, especially considering the

minimal improvements Apple was making over the past couple of iOS releases.

It's the biggest change to the iPad experience ever, and it'll be a winner for users who like to use the same device for working at a desk and reading through content while lazing on a sofa. It's still not perfect: I suspect I'll still prefer even the typing experience of the MacBook's 'butterfly' keyboards over the stiff typing I endure with the iPad Pro's Smart Keyboard Folio. For that reason alone, it's far too early to see iPadOS as some kind of death knell for the MacBook.

It feels as though it's part of a wider shift at Apple – one in which the firm is finally giving serious thought to the frustrations and workflows of people who use their devices on a daily basis. Both iPadOS and the Mac Pro are far more robust releases than I would have expected even a year ago. It shows us an Apple that's willing to move away from its own little oddities and embrace the demands needed to meet an increasingly competitive market. At the very least, it's a sign that Apple is making sure its 'pro' products live up to that name.

We're impressed, Apple. But with all those other improvements to the iPad, you seriously couldn't have added a built-in Calculator app?

6 ways Apple is turning its watch into a mini iPhone

Apple's watch is getting independence. [Michael Simon](#) reports



When the Apple Watch arrived back in 2015, it was very much an iPhone accessory. That's steadily been changing with native apps and the addition of cellular support, but with watchOS 6, the Apple Watch barely needs an iPhone at all. Here are six ways Apple has made Apple Watch independent in watchOS 6.

1. You can install apps on your wrist

One of the biggest Apple Watch annoyances has always been its reliance on the iPhone to download and install apps. Not only do we have to use the

iPhone app to find new apps but we also need to have a companion app installed on our phone in order to use it on our wrist. But that's changing.

With the introduction of a standalone App Store, Apple is finally giving us full app independence on the Apple Watch, with not just native app support but a whole new native UI framework that will let developers focus on watchOS development without needing to provide a separate app on the iPhone as well. This should lead to a surge in Apple Watch apps and much greater capability and functionality.

2. You'll get a full picture of your health

Health and fitness tracking has been one of the main benefits of the Apple Watch since day one, but we haven't been able to do all that much on our wrist. But watchOS 6 brings several new health apps and features to monitor things such as hearing, and cardio fitness – and you won't need to take out your iPhone and launch the Health app.

With watchOS 6 you'll be able to see a live reading of the decibels in the room you're in, as well as check out your monthly and annual activity trends. And female users will be able to log and view key aspects of their cycle, including fertility windows and symptoms they're experiencing. And you won't need to reach for your iPhone to do any of it.

3. It has a calculator

While there are plenty of third-party calculators available for the Apple Watch, Apple is finally

bringing a stock Calculator app to watchOS. It might not seem like much, but it's a clear sign that Apple wants you to reach for your watch first when you need to do simple tasks. Based on Apple's description, there's nothing groundbreaking here – Calculator will let you do things like calculate tips and split bills when you're at a restaurant – but the fact that it took until watchOS 6 to get it signals a shift in Apple's thinking.

4. There are tons of new complications

Along with new watch faces like gradient, California, Solar Face, and Modular Compact, Apple has added a bunch of new complications that let you get information at a glance without opening an app or turning to your phone. For example, the

WatchOS 6 is delivering lots of new Watch Faces and complications



new Noise app has a complication that shows a live reading of the ambient decibel level and you'll also be able to track wind, rain, lots of other things. And in watchOS 6, you can finally reorder your Watch Faces as well – all without opening the Watch app on your iPhone.

5. You'll be able to log into your accounts

It's happened to us all. We open an app on our Apple Watch only to get a message: Please log into your account on your iPhone. With watchOS 6 that message will be a thing of the past, with the new ability to log into your accounts right on your wrist. We're not sure how far Apple is extending it, but with an App Store and native apps, we shouldn't need to log into anything on our phone anymore.

6. The software will update automatically

If you're ever updated an Apple Watch, you know how tedious it can be. In watchOS 6, your Apple Watch will update automatically without needing to download an update on our iPhone first. That'll save time and annoyances – and give us one less reason to pick up our iPhone.

tvOS 13: 6 cool new features to check out

The list of new features isn't huge, but it's certain to make a lot of users happy. [Michael Simon](#) reports



Apple didn't introduce any new Apple TV hardware at this year's WWDC, but it did announce several new features for tvOS 13 that make Apple's set-top box a far more attractive device. In tvOS 13, it's easier for multiple family members to personalize the device, and Apple also introduced features that allow Apple TV to act more like a regular game console. Here are the updates we're anticipating most.

1. A redesigned home screen

The current Apple TV home screen is dull when compared to what you find in the Netflix streaming app. With tvOS 13, though, the Apple TV home screen will take a cue from those apps and start playing trailers when you slide over TV and movie apps and even specific episodes. Much as in the Netflix app, these trailers will dominate the screen behind the interface, giving you a good idea of what you'll be watching within a matter of seconds.

2. Support for multiple users

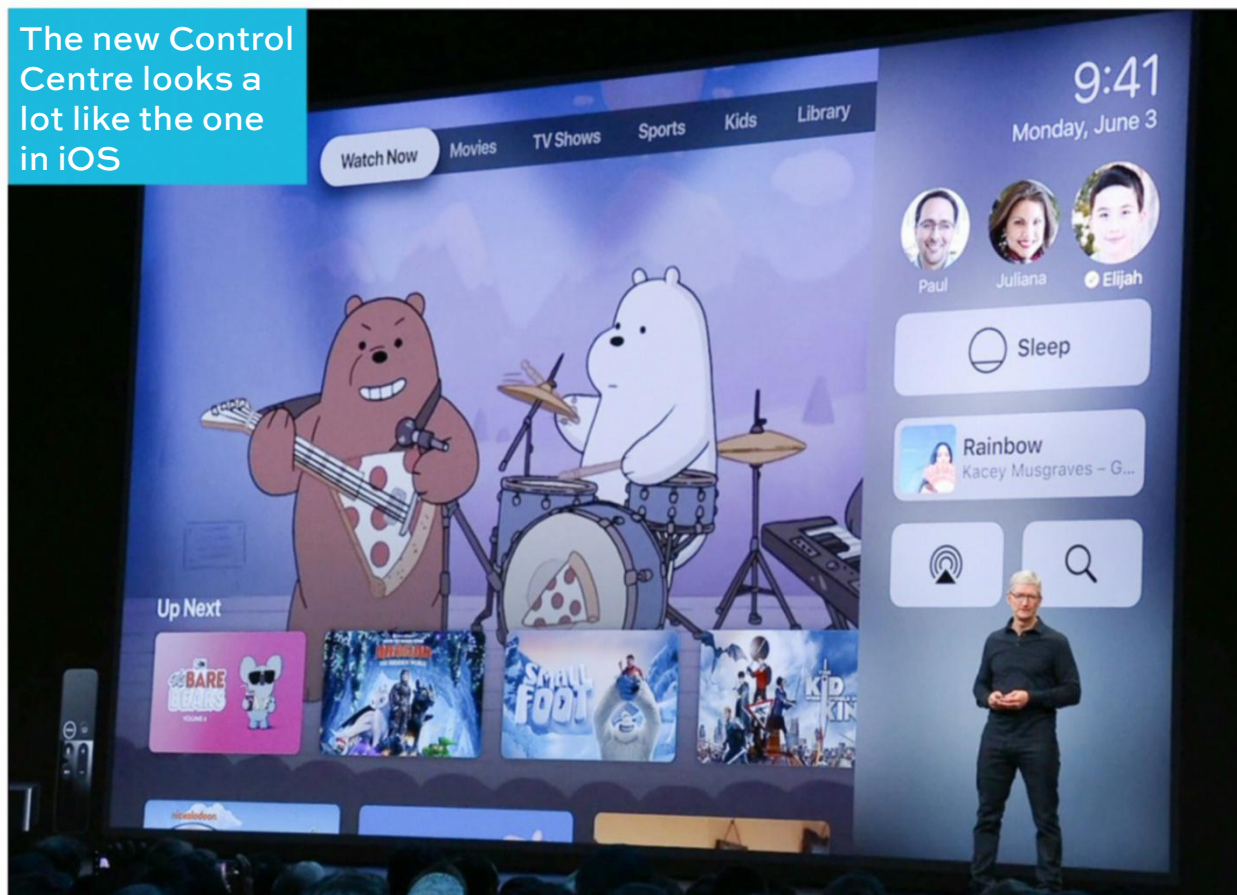
You can technically already set up Apple TV for multiple family members, but it's a cumbersome process that involves going into Settings and signing out. But soon, however, Apple will allow you to switch between users through a new Control Centre that's being introduced in tvOS 13.

Apple didn't spend much time explaining this feature, but it looks as though switching users will be even easier than it is on macOS. It'll also enable an 'Up Next' feature that's better suited to your specific preferences.

3. Support for Xbox One and PlayStation 4 game controllers

Makers of MFi (Made for iOS) game controllers were probably stunned to hear Apple's keynote, as Apple TV will now support controllers made for both the Xbox One and PlayStation 4 consoles. The newly supported controllers will work with Apple Arcade when it drops sometime later this

The new Control Centre looks a lot like the one in iOS



year. First, this means you won't have to spend any time wondering if your controller will support any particular game's controls. Secondly, you won't even have to buy a special tvOS controller if you already have an Xbox One or PlayStation 4.

4. New screen savers

If you want your Apple TV's idle screen to become a beautiful backdrop for your living room, you'll be happy to know that Apple is introducing lovely HDR underwater screen savers made in partnership with BBC Natural History. Much like Apple's high-res desktop wallpapers for macOS, these new

Apple is introducing HDR underwater screen savers made in partnership with BBC Natural History



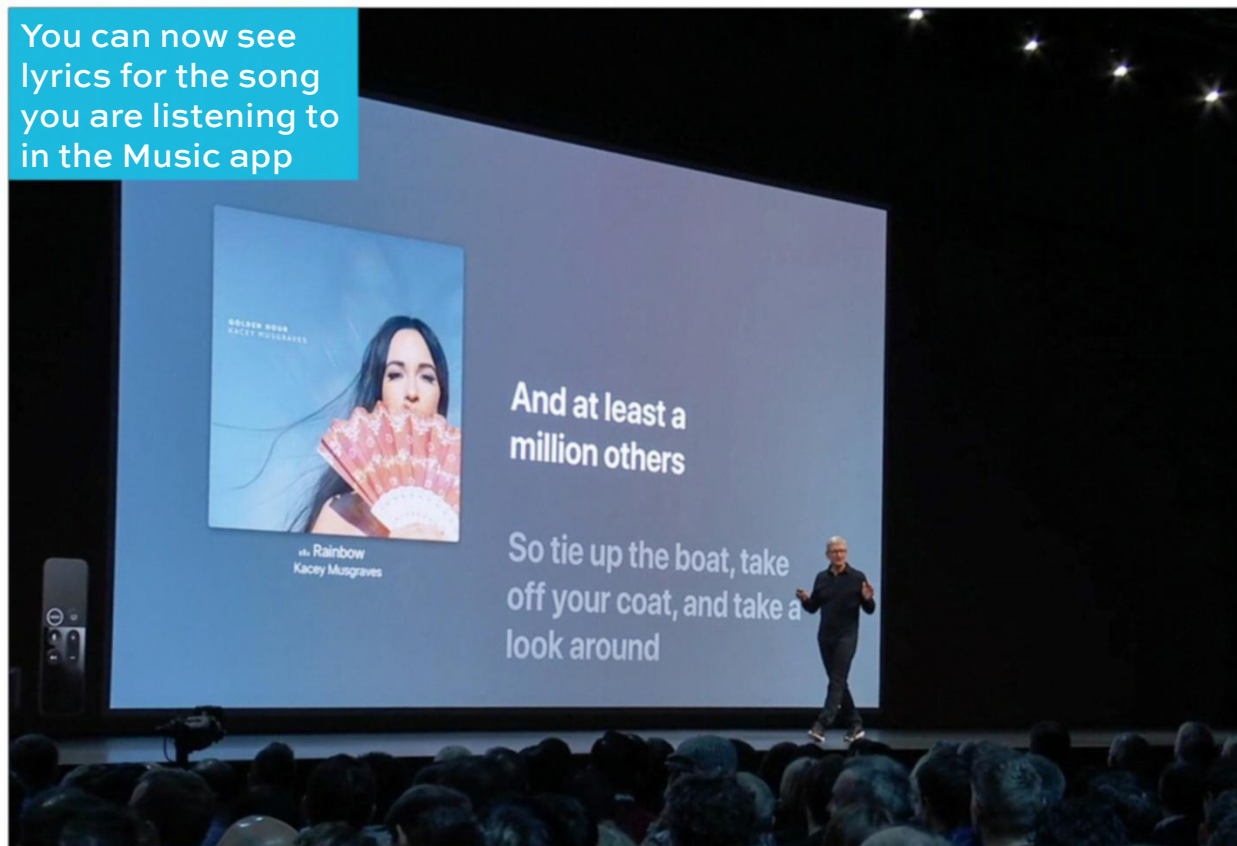
screen savers will be a great way to celebrate both nature and tech in one stroke.

5. A hint of 4K movies coming to AppleTV+

Apple kicked off the presentation by showing off a trailer for *For All Mankind*, a new series for the upcoming Apple TV+ service that takes place in an alternate version of history in which the Soviet Union was the first country to land on the moon.

This isn't exactly exclusive to the Apple TV hardware, as you'll be able to watch it on your iPhone, your Mac, and hopefully some other devices. But exclusivity aside, *For All Mankind* looks like truly compelling TV, and suggests that Apple

You can now see lyrics for the song you are listening to in the Music app



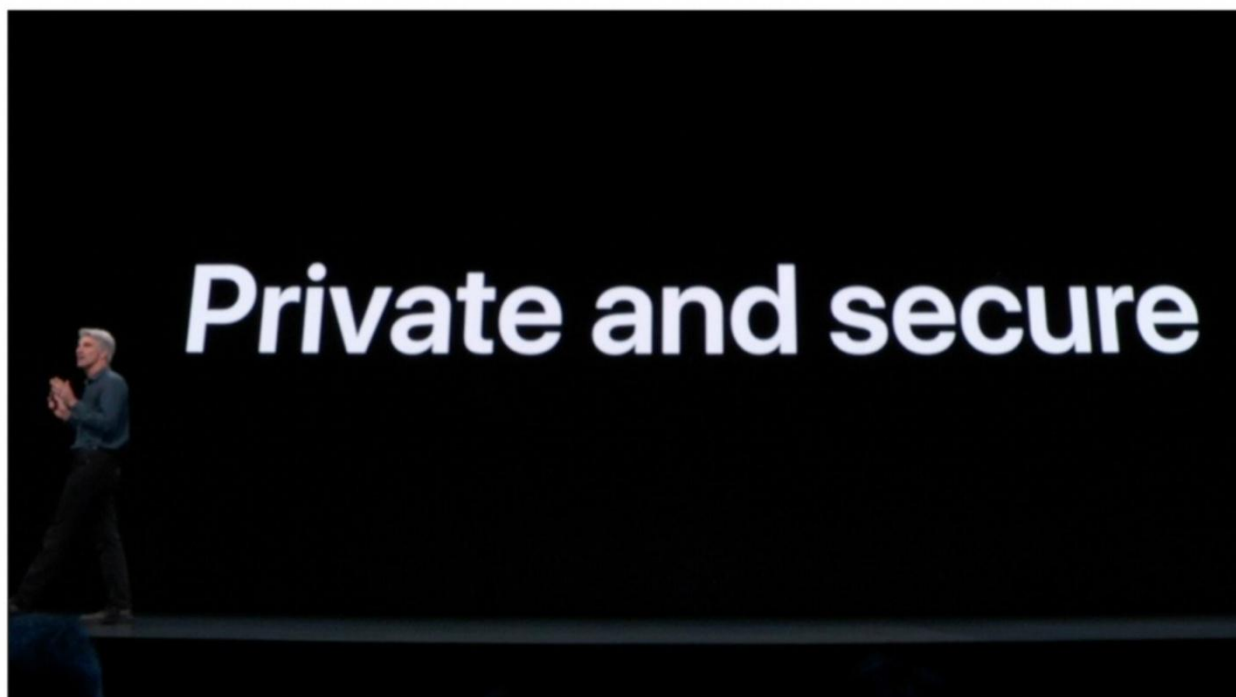
original series will easily compete with the likes of original content from Netflix, and Amazon.

6. Lyrics in the Apple TV's Music app

With tvOS 13, you'll be able to see lyrics for the song you're listening to in the Apple TV Music app. It's a small feature, but being able to read lyrics with the help of the Genius service is one of the best features in Spotify, and we're excited to see something like that come to Apple TV.

The star of WWDC wasn't the Mac Pro. It was privacy

Sign In with Apple could be the first step toward locked-down Apple authentication. [Michael Simon](#) reports



During Apple's two-and-a-half hour WWDC keynote, we were treated to lots of great moments. Craig Federighi's quip about how bloated iTunes has become. The introduction of iPadOS. And of course, the new Mac Pro.

But the theme of the show was a familiar one: privacy. For the past few years, Apple has hammered home its belief in our devices and data staying in our hands, but at WWDC it put its privacy where its mouth is. Rather than rehashing

themes or trotting out the usual rhetoric, Apple gave privacy a central role in every new product it announced, drawing attention to both how our devices protect our data and what could be a target.

Anyone can talk a good privacy game, but Apple is one of the few companies that is actually taking action. While it didn't specifically mention Google or Facebook when talking about any of the new privacy features, the line in the sand between them and Apple became even deeper with features such as one-time location sharing and background tracking alerts.

Apple's privacy push extends to watchOS, too. One of the main features is an app called Noise, which routinely monitors background sound and alerts you when a sustained sound might be damaging to your hearing. It's the kind of surprise-and-delight feature only Apple would think of putting in a smartwatch – let alone attempt to implement in an existing consumer product at a massive scale. But Apple also considered something most people wouldn't think of: all of Noise's audio processing are done in real time, and Apple doesn't record or save any of the sounds it hears.

For any other company, that's not a day one feature. It's something that's added following an apology when someone uncovers a secret trove of audio recordings on a server. Or even worse, after said recordings are stolen as part of a hack. The Noise app announcement could have come and gone without a promise of privacy and no

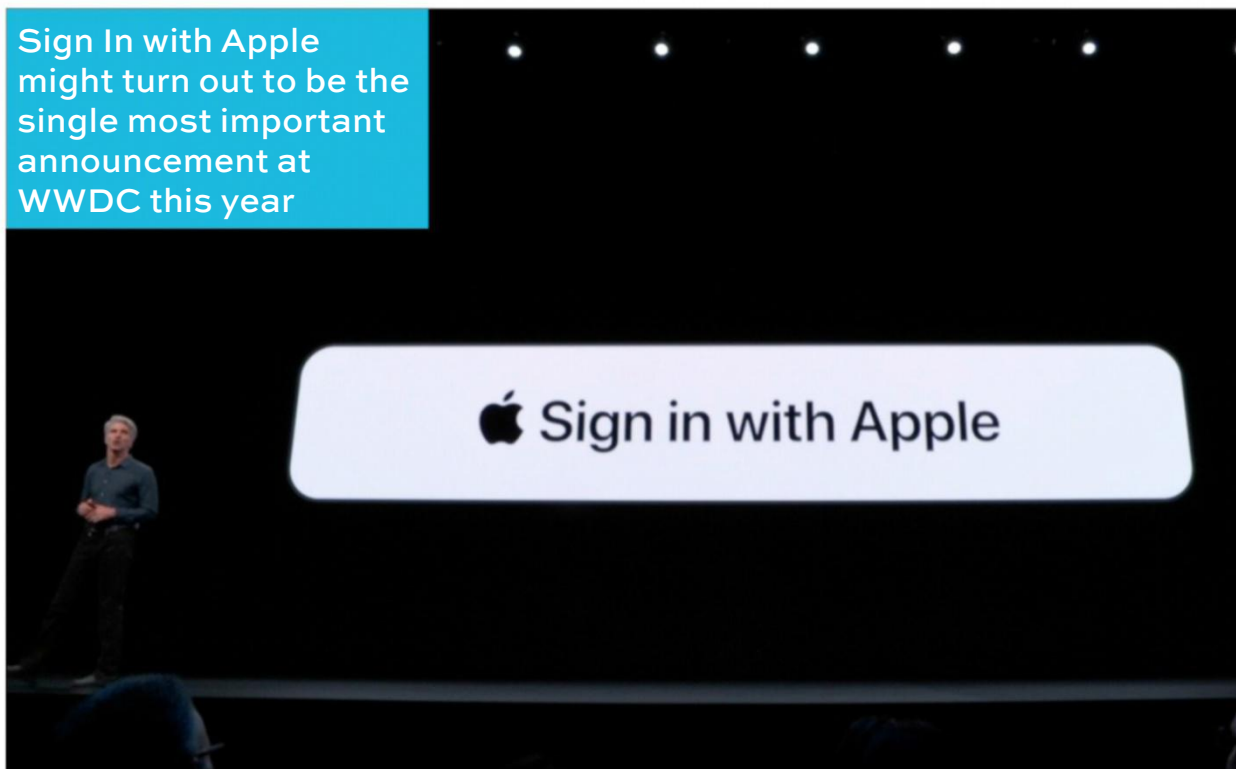
one would have questioned it. No one would have even thought of it.

Apple thought of a bunch of other things too. Check out any of the WWDC software announcements and you'll find a section devoted to privacy. Apple is committed to making privacy and tracking simple, automatic, and easy to understand and limit, a stark difference to the way things work on all those other phones. And now Apple isn't limiting privacy to iPhone users anymore.

Single, simple, and secure sign-ins

One of the low-key killer WWDC announcements is 'Sign In with Apple'. Similar to the programs already offered by Google, Facebook, Twitter and others, the Sign In with Apple button will let you

Sign In with Apple might turn out to be the single most important announcement at WWDC this year



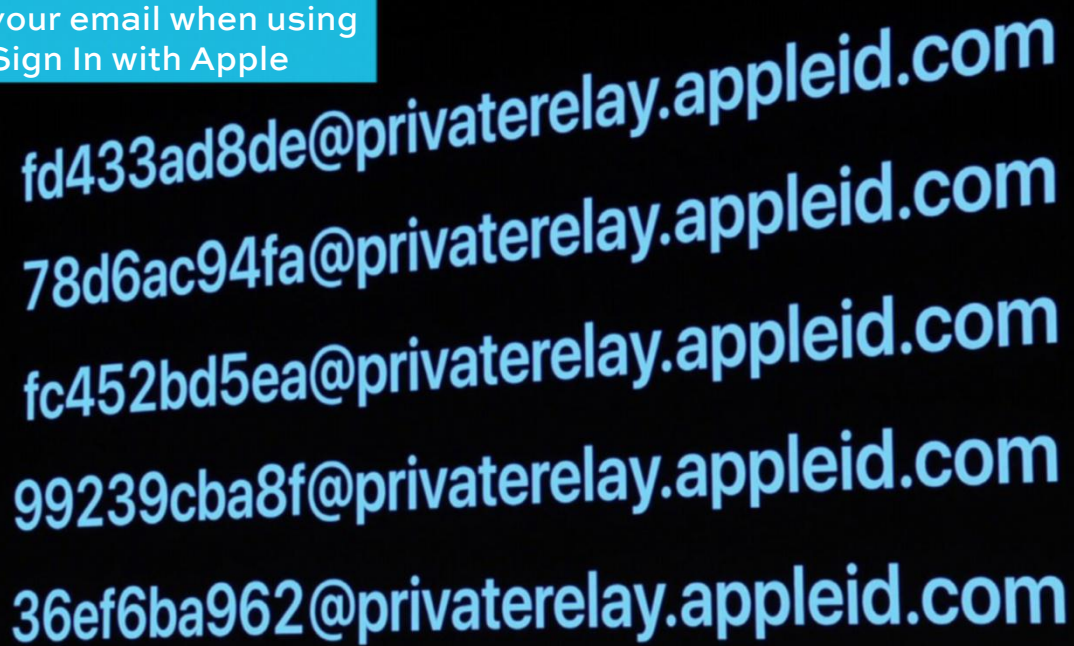
use your Apple ID to log into apps and websites without needing to set up a new account or create a new password.

But convenience is only part of what makes Sign In with Apple such an excellent feature. Apple has baked privacy and security so deep into Sign In with Apple that it won't work unless your account is protected with two-factor authentication. It uses Face ID or Touch ID on the iPhone and iPad. The coolest feature of all: you can opt to use a fake email address that forwards to your real one so the service you're signing into won't have access to your contact details.

And of course, neither does Apple. To make sure developers adopt it, the tech giant is requiring it for all iOS apps that offer a sign-in option. Apple has received a bit of criticism for making it mandatory, but I'm all for it. Yes, Apple customers are more likely to click the Sign In with Apple button, but that also means they'll have a protected account. According to Aaron Parecki of Okta, who made a test app to try it out, Sign In with Apple prompts for a 2FA code every time you log into an app, which could get tedious for apps and devices that don't use biometric authentication, but it's a necessary step for insuring security.

Parecki also writes, "The only piece of useful data in the claims really is the sub value. This is the unique identifier for the user. It's notable that this value doesn't mean anything in particular, which is Apple's way of preserving user privacy." That means developers can track how often a certain user is

Developers won't even have access to your email when using Sign In with Apple



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fc452bd5ea@privaterelay.appleid.com
99239cba8f@privaterelay.appleid.com
36ef6ba962@privaterelay.appleid.com

signing into their service, but they won't know who that user is.

Simply put, that's a massive step forward for privacy. Developers may gripe that it's a requirement it – and the rumour that Apple is forcing developers to put Sign in with Apple at the top of the list might go a little too far – but there's no downside for users here. They can log into their favourite accounts and be protected from both prying eyes and unscrupulous developers. Truth be told, we don't know what Google, Facebook, and developers are doing with the emails and info they get when you use an 'easy' button to log in. With Sign In with Apple, we do know: nothing.

Apple privacy everywhere

Apple has long hammered home the belief that the iPhone is the most secure smartphone on the planet, but for the first time, it's extending that beyond Siri and iCloud encryption. With Sign In with Apple, the privacy that you get with Apple apps to the other services we use.

You don't even need an Apple device to take advantage of it. Apple will be allowing Sign In with Apple buttons for web log-ins as well, so people on Android and Windows could be using it as well, enjoying iPhone-calibre privacy without an Apple device. And I'm willing to bet Apple is working on taking it even further. I could see iOS 14 bringing an Apple Authenticator app for generating unique codes across platforms and apps. Or maybe just turning the Apple Watch into a Bluetooth security key.

Apple often says that privacy is a right and not a privilege. With iOS 13 and Sign In with Apple, it's proving that you don't need to buy a thousand-pound device to get it

Apple upgrades processors in MacBook Pro line-up

Apple's MacBook Pro now features eight- and ninth-generation Intel Core processors. [Roman Loyola](#) reports



Apple announced recently that the MacBook Pro is getting a speed boost. The company revealed that the 13in MacBook Pro with Touch Bar is now available with eight-generation Intel processors, while the 15in MacBook Pro now sports ninth-generation CPUs, including the first 8-core Mac laptop.

The tech giant also said that the 2019 MacBook Pro features changes to the butterfly keyboard mechanism that should help prevent the problems

that users have experienced in previous MacBook models. The new models are also included in Apple's Keyboard Service Programme, which means that the company will repair the keyboard for free up to four years after purchase. Apple is offering the new MacBook Pro models at the same price points as those released in July 2018.

15in MacBook Pro

The £2,699 15in MacBook Pro could be the fastest Mac laptop ever, with its ninth-generation 8-core 2.3GHz Core i9 processor, with Turbo Boost up to 4.8GHz. Apple says the new MacBook Pro is two times faster than a quad-core MacBook Pro, and 40 percent faster than the 6-core model that was introduced last July. Other specs include 4GB Radeon Pro 560X graphics, 16GB of 2,400MHz DDR4 memory, and a 512GB SSD.

The £2,349 15in MacBook Pro now has a ninth-generation 2.6GHz 6-core Intel Core i7 processor, an upgrade from the eighth-generation 2.2GHz 6-core Core i7 CPU that was introduced last year. Other specs include 4GB Radeon Pro 555X graphics, 16GB of 2,400MHz DDR4 memory, and a 256GB SSD.

13in MacBook Pro

As for the 13in MacBook Pro, the £1,749 and £1,949 standard configurations get new eighth-generation quad-core Core i5 processors.

The £1,749 model now has an eighth-generation 2.4GHz quad-core Core i5 processor, which

replaces an eighth-generation 2.3GHz quad-core Core i5 processor in the model released last July. The rest of the key specs remain unchanged: integrated Intel Iris Plus Graphics 655, 8GB of 2133MHz LPDDR3 memory, and a 256GB SSD.

The £1,949 13in MacBook Pro has the same eighth-generation 2.4GHz quad-core Core i5 processor, integrated Intel Iris Plus Graphics 655, and 8GB of 2133MHz LPDDR3 memory as the £1,749 model. The extra cost is for a 512GB SSD.

The £1,249 and £1,449 models remain unchanged with seventh-generation 2.3GHz dual-core Core i5 CPUs. These models were introduced in 2017.

Apple improves the butterfly keyboard (again)

Apple says it has shortened the time it takes to implement repairs to the keyboard. [Roman Loyola](#) reports



According to Apple, the vast majority of users of recent MacBooks are happy with the butterfly switch keyboard, which was introduced in 2015. It's not, however, difficult to find users who are not.

Along with the announcement of new MacBook Pros (see [page 92](#)), Apple announced that the company will now fix any problems with the

MacBook keyboard at no cost to the owner. This offer is only available for the following laptops:

- 12in Retina MacBook (2015 to 2017)
- MacBook Air (2018)
- 13in MacBook Pro (2016 to 2019)
- 15in MacBook Pro MacBook Pro (2016 to 2019)

Also, to reduce the inconvenience to the user, Apple said that it has shortened the time it takes to implement repairs to the keyboard. Apple has a support document with details on the Keyboard Service Programme (fave.co/2K6Bugb).

The firm also said that the 2019 MacBook Pro features changes to the butterfly keyboard mechanism that should help prevent the problems that users have experienced, such as unresponsive keys or double-typing.

What Intel's road map updates mean for the Mac

Until Apple starts using its own processors in Macs, the future of Intel is the future of Apple's laptops. [Jason Cross](#) reports



Apple may end up making Macs with processors of its own design, but that's not expected to happen soon. And if it does happen, it probably will take several years before the entire Mac line-up has transitioned to Apple-designed chips. In the meantime, it's safest to assume that the Macs of the next couple years will primarily use Intel processors. So any time we can get a look at Intel's road map, we're getting a peak at the heart of the Mac.

In May, during an investor presentation, Intel extended its public road map through 2020 and gave an update on future products and manufacturing processes. Here's what that means for the Mac.

Ice Lake this year

Intel has been struggling to bring 10nm chips to market – the 14nm process node has lasted two years longer than expected – but it will finally ship volume processors for consumers with the 10nm process this year. The company's first large-scale 10nm consumer product is code-named Ice Lake, and is expected to ship to Intel's customers in June. It's aimed at laptops, from ultra-portable up to high-performance models.

Ice Lake processors use Intel's brand-new Sunny Cove CPU architecture, which should deliver the

Ice Lake should bring big performance benefits to MacBooks

10NM ICE LAKE CLIENT

Shipping in June

APPROX.

- 2X** Graphics Performance
- 2.5X-3X** AI Performance
- 2X** Video Encode
- 3X** Wireless Speeds

Disclaimer: Results are approximate and have been estimated or simulated as of April 2019 using Intel internal analysis or architecture simulation or modeling. Graphics and video - Intel Gen Graphics Iris Plus Experience. Wireless - Intel's 802.11ax typical competitive 11AC design. AI - ADXPR1 Classensity 2 Precision, OpenVINO 2018.R5, Max Throughput 15W WRT to 15W ICJ projection.

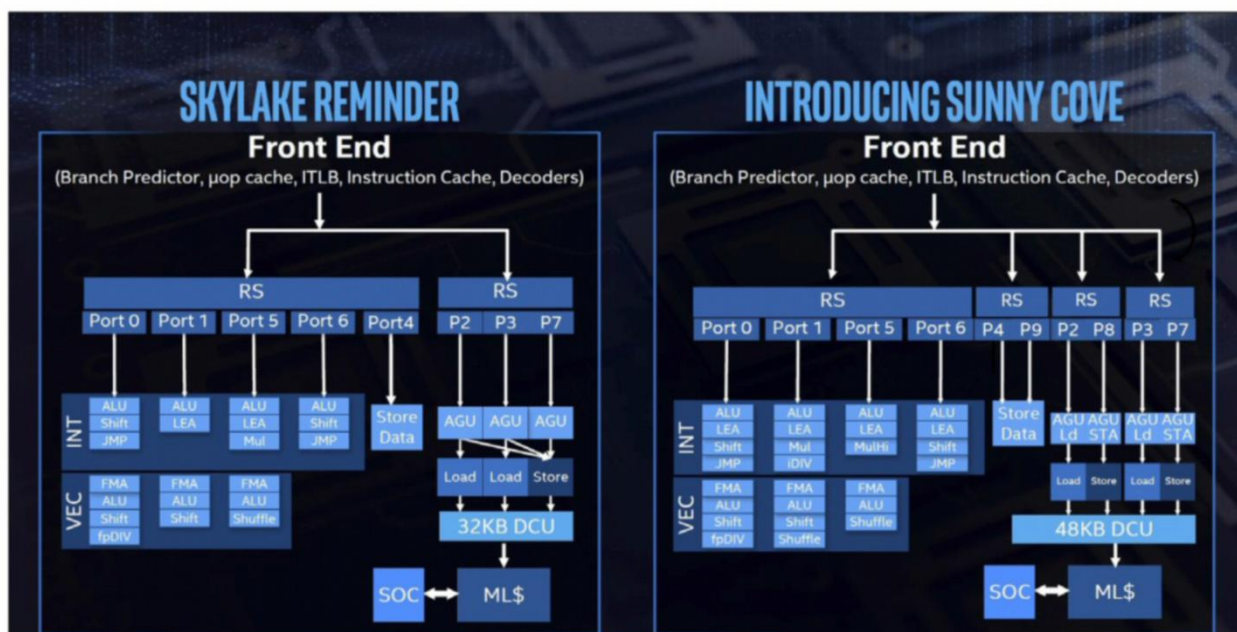
For more complete information about performance and benchmark results, visit www.intel.com/benchmarks. Performance results are based on testing as of date specified and may not reflect all publicly available security updates. Full configuration disclosure for details. No product or component can be absolutely secure.

intel INVESTOR MEETING

first real boost in single-thread performance in a long time. Most of Intel's speed gains over the past few years are due to boosting clock speeds and adding cores, but the Sunny Cove architecture is expected to make each core faster, clock-for-clock.

Ice Lake should deliver the biggest boost in the non-CPU parts of the chip, however. The new Gen-11 graphics core will be up to twice as fast as the graphics in today's MacBooks (except the 15in MacBook Pro, which uses AMD's Radeon graphics). It will also speed up AI operations by a large amount, and incorporate faster wireless networking and integrated support for Thunderbolt 3.

All told, it means a new set of MacBooks with significantly faster CPU performance and much faster graphics performance. In particular, these



The Sunny Cove cores will feature the first major changes to an Intel x86 core since Skylake CPUs were introduced in 2015

Intel Investor Meeting 2019

1. ACCELERATING THE PACE OF INNOVATION

	3X* WIRELESS SPEEDS ¹		2X* PRODUCTIVITY IN SLIM FORM FACTORS ⁴
	4X* GRAPHICS PERFORMANCE ²		4X* ENCODE PERFORMANCE ⁵
	2.5-3X* AI PERFORMANCE ³		

Tiger Lake is still 10nm, but should be a significant step up from Ice Lake. These figures are in comparison to Whiskey Lake (the current 15-watt ultraportable chips)

* Approximate

Analysis or architecture simulation or modeling.

1. 2x2 vs 9W TGL 4+2 projections

2. 800 to TGL 8000 projections

3. intel.com/terms/remarks: Performance results are based on testing as of date specified

4. Ensure for details. No product or component can be absolutely secure.

chips should greatly accelerate video encoding, so video professionals are probably going to want to upgrade. Faster integrated wireless and a built-in Thunderbolt 3 controller may mean reduced internal complexity for Apple, which could mean thinner or lighter MacBooks, or maybe just more battery capacity.

It's likely that Apple will have new MacBooks with these chips ready for the autumn, instead.

After Ice Lake comes Tiger Lake, another 10nm chip that is expected to significantly boost performance again, especially in the areas of graphics, AI computation, and video encoding. It will incorporate Intel's next-generation Xe graphics technology, which will eventually power all Intel's graphics products, including new add-in cards for PCs and, presumably, discrete graphics chips that

Intel Investor Meeting 2019

INTELLIGENT AGENTS LAKEFIELD

SOFTWARE	OpenVINO		
SECURITY	UFS Inline Encryption	Boot from UFS	VBS
INTERCONNECT	UFS 3.0	USB 3.0	MIPI CSI2
MEMORY	POP DRAM		
XPU ARCHITECTURES	HYBRID ARCHITECTURE		GEN11 Graphics
	Sunny Cove CPU	Tremont CPU	
PROCESS & PACKAGING	Foveros 3D Integration 10nm Compute Die, Low Power Base Die		

Results have been estimated or simulated as of April, 2019 using internal Intel products or architecture simulation or modeling on ARM product

APPROX

- 10X Standby SOC Power Improvement
- 1.5-2X Active SOC Power Improvement
- 2X Graphics Performance
- 2X PCB Area Reduction

Lakefield will reach consumers late this year or early next year, but it may never be used in a Mac

Apple could use in the iMac or Mac Pro. Tiger Lake is expected to land in 2020, though the exact timing is not clear. If it's later in the year, we probably won't see Tiger Lake Macs until 2021.

Lakefield next year (if ever)

Intel has another 10nm product coming up later in 2019, code-named Lakefield. It's a 3D chip-stacking technology that lets Intel stack the main processor, RAM, and platform architecture stuff like storage and USB controllers all on top of each other. The idea is to cram everything into a much smaller area.

Lakefield isn't really aimed at traditional clamshell laptops like MacBooks. It's meant to go in convertible tablets, folding two-in-ones, and other innovative new form factors.

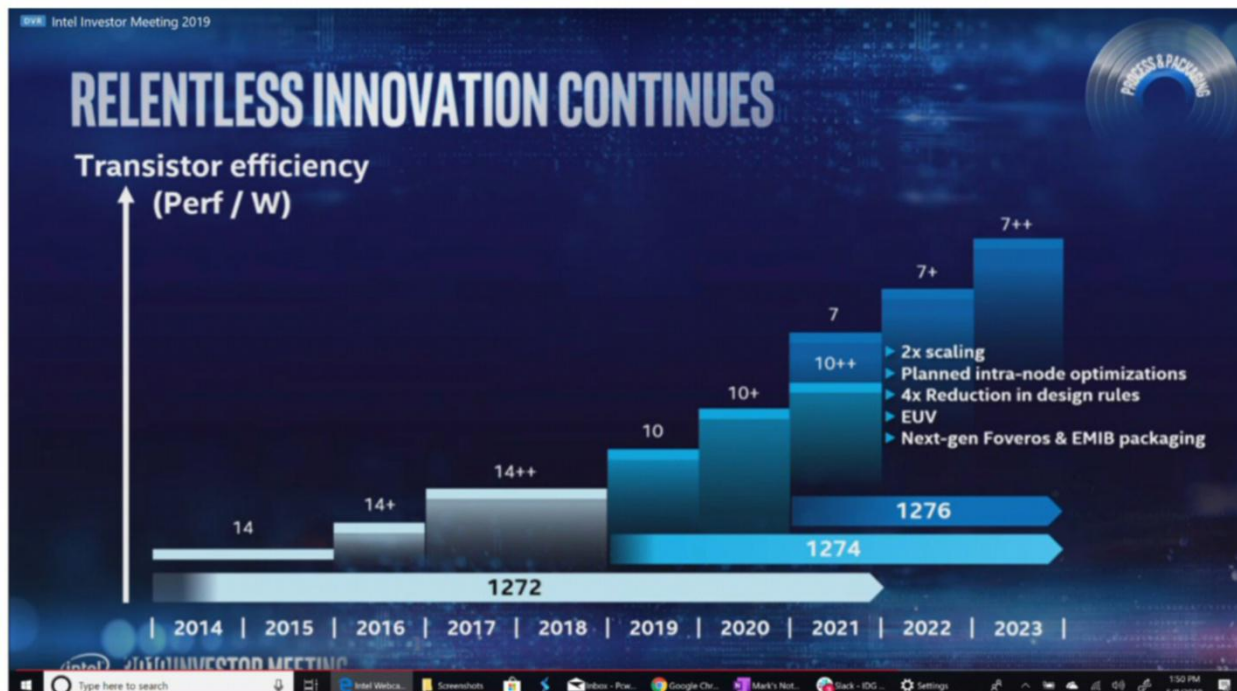
It's not clear whether Apple would want to pursue Lakefield as a solution for the Mac. When the company wants innovative portable devices, it turns to iOS and its own processors. However, it might be a good choice for products like the 12in MacBook or the MacBook Air, which prioritize portability and battery life over top-end performance. The very small footprint of a Lakefield-based logic board would leave a lot more room inside those laptops for more battery.

If Apple does anything with Lakefield, we probably won't see it until 2020. Apple is rarely in the first wave of products to use a new Intel processor or platform, and the very first Lakefield-based PCs are expected to come to market at the end of the year.

7nm is a long way off for Intel

Intel cautioned that its 10nm manufacturing process, already years late, is going to be around for a while. Its lead product for 7nm is expected to come in 2021, but it's going to be for servers and data centres that do high-performance computing and AI work.

Apple's A12 is already built using a 7nm process, and by 2021 it's expected that TSMC (Apple's go-to partner for chip manufacturing) will be ready with its 5nm process. We should note that not every company measures chip feature sizes the same way, and that Intel's 10nm process is closer to TSMC's 7nm, while Intel's 7nm process will be close to TSMC's 5nm process.

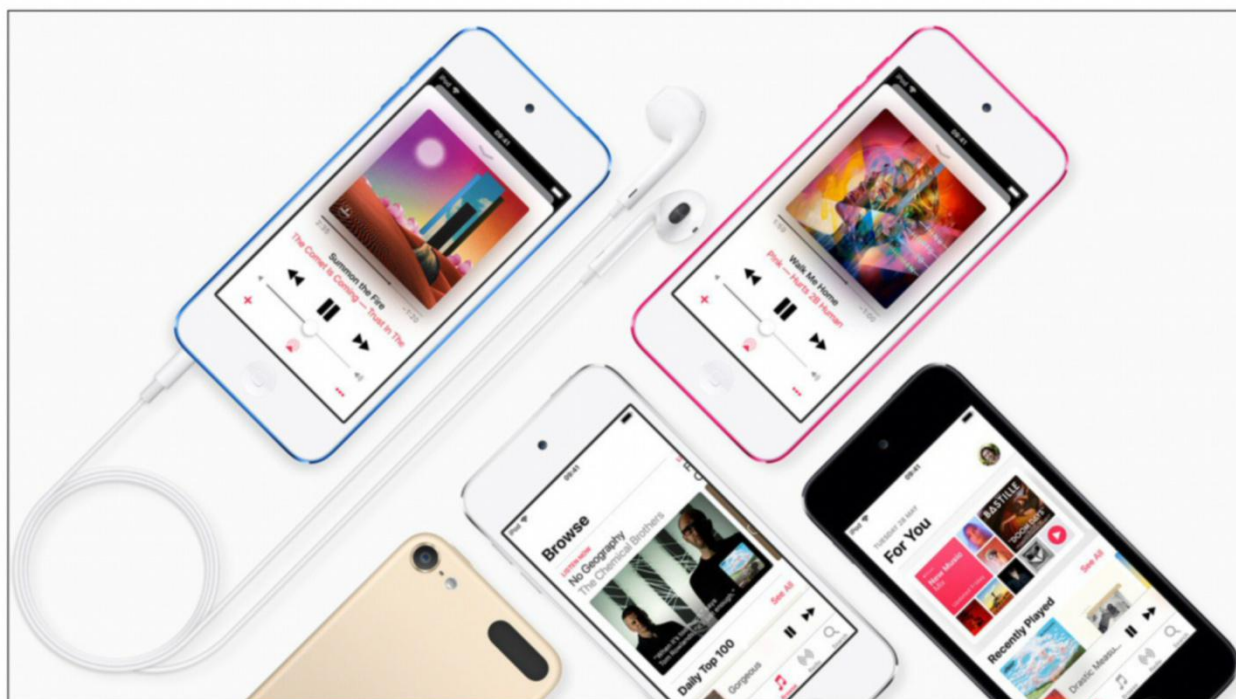


10nm is going to stick around for a long time, but we won't be stuck with it as long as we were with 14nm

Intel may not have 7nm consumer parts ready until 2022 – and even if they come late in 2021, Apple may not be able to bring it to the Mac until then. That leaves a lot of time for Apple to transition the Mac to its own ARM-based chips.

Apple's surprise iPod touch refresh

The seventh-generation iPod touch has an A10 processor and a new 256GB storage option. [Michael Simon](#) reports



For the first time since 2015, Apple has announced a new iPod touch, though you wouldn't know it by looking at it. It has the same 4in screen, colour selection, and bezel-heavy outdated design. But now it's fast enough to run AR apps and Group FaceTime.

Apple has updated the A8 processor in the iPod touch with an iPhone 7-era A10 Fusion chip, the same silicone that powers the low-end iPad. That's still nowhere near as fast as the A12 Bionic chip in



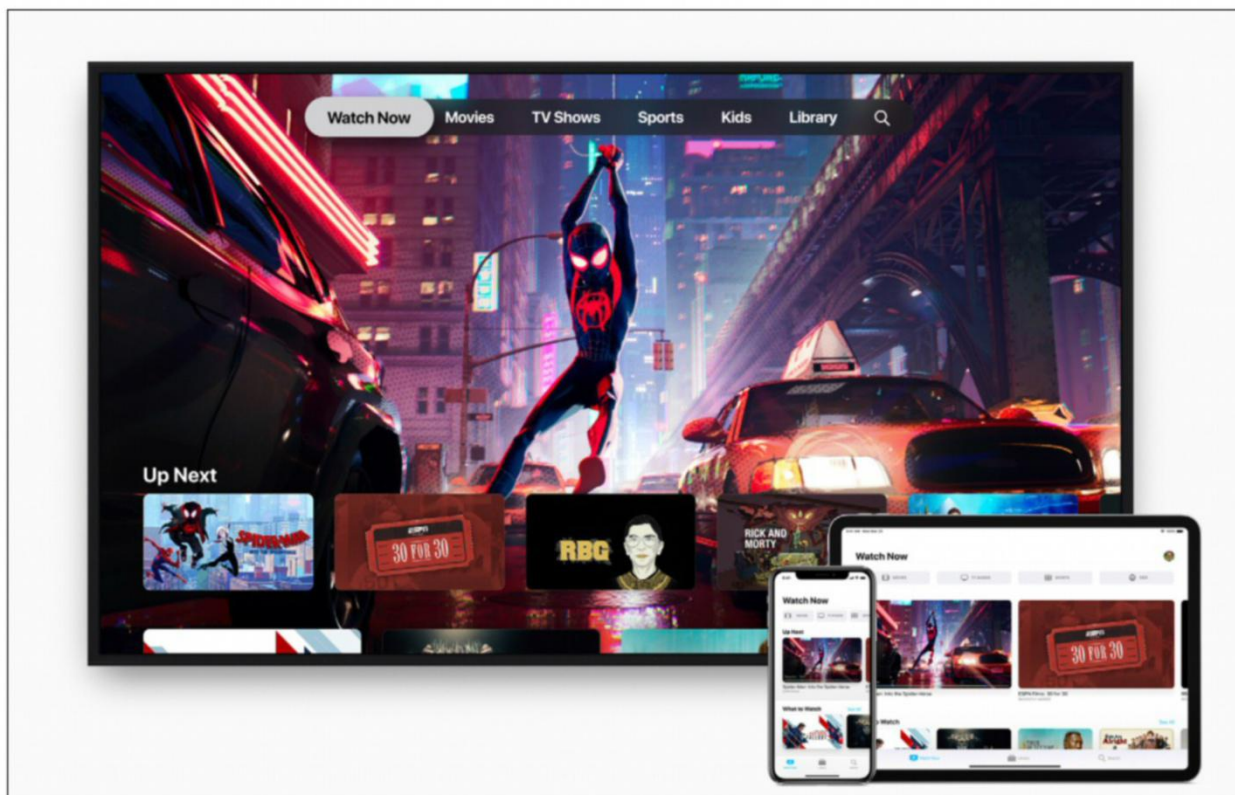
the iPhone XS, but it's definitely an improvement. Like the old model, the new iPod touch starts at £199 for 32GB, but there's an extra 256GB option now for £399, in addition to the £299 128GB model. Unfortunately, the new iPod touch ignores many of Apple's newer features, including wireless charging, dual cameras, and Animoji. But it does come with a 3.5mm headphone jack.

Apple introduced the iPod touch following the launch of the iPhone in 2007, and it received regular updates until 2012, when it began to lag behind Apple's more popular products. With this refresh, the dreams of an iPhone X-styled iPod touch are dashed, and we can probably expect this model to stick around until at least 2021.

The new iPod touch is available in six colour options: space grey, silver, gold, blue, pink and red.

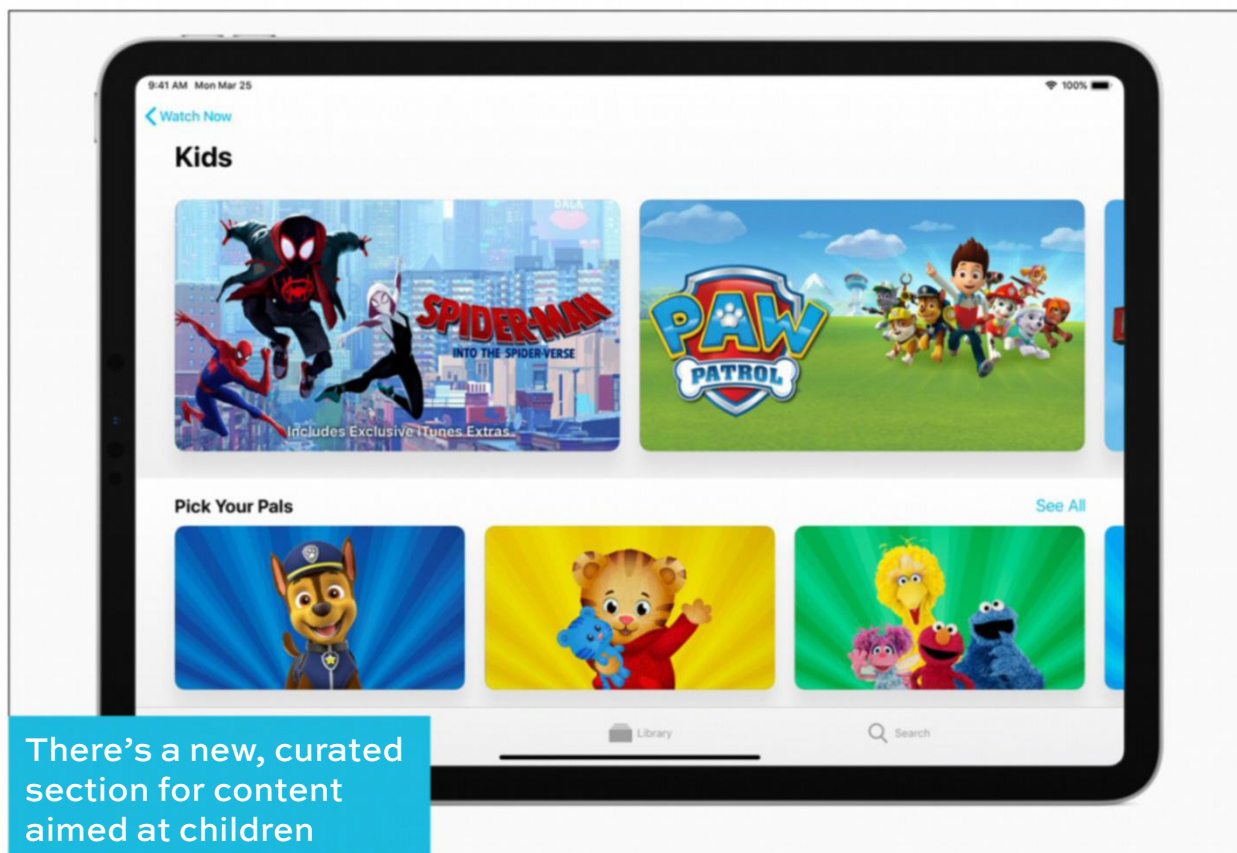
New Apple TV app is here

Apple's new app offers Family Sharing, access to 150 streaming apps, and offline viewing. [Leif Johnson](#) reports



Apple has released the redesigned version of the Apple TV app, which it first announced back during its 25 March event. It's a wide roll-out, as Apple lets you access more than 150 different streaming apps, and it's extending it to 100 countries on iOS along with releases for Apple TVs and Samsung's latest smart TVs.

Notably, the update includes Apple's subscription-based Channels feature, which is the first big step toward making the Apple TV app more



There's a new, curated section for content aimed at children

appealing in preparation for the launch of Apple TV+ sometime this autumn.

On the iPhone, it's rolled into the iOS 12.3 update, which comes with the usual 'performance improvements', but also fittingly lets you beam video or music content from your iPhone or iPad to smart TVs that support AirPlay 2. On the Apple TV, it's available through tvOS 12.3.

The Channels feature is the star of the show, and it's the biggest service rollout we've seen from Apple since Apple News+ dropped back in March. Up until now you've had to subscribe to services such as Sky through a separate app, but Channels lets you subscribe to them straight through the

Apple TV app itself (allowing Apple, of course, to get a tidy cut of the profits). If you have already signed into Sky Go through the app though, clicking on Game of Thrones through the Apple TV app will cause the Sky Go dedicated app to open.

The app takes some heavy inspiration from Apple Music, and seemingly for the better. There's now an 'Up Next' section, for instance, which lets you view content that's synced across all your devices, and the app also now offers recommendations based on your viewing history. You'll also find a new, curated section for content aimed at children, but it'll send you to third-party apps rather than offering it through the new Channels.

The Apple TV app may have changed a lot, but many of the best features still remain. Along the bottom of the app, for instance, you'll still find the Library tab, where you can watch all the movies and shows you've already bought from iTunes.

Why the Mac Pro is Apple's love letter to forgotten die-hard Mac fans

A reboot for the old school. **Michael Simon** reports

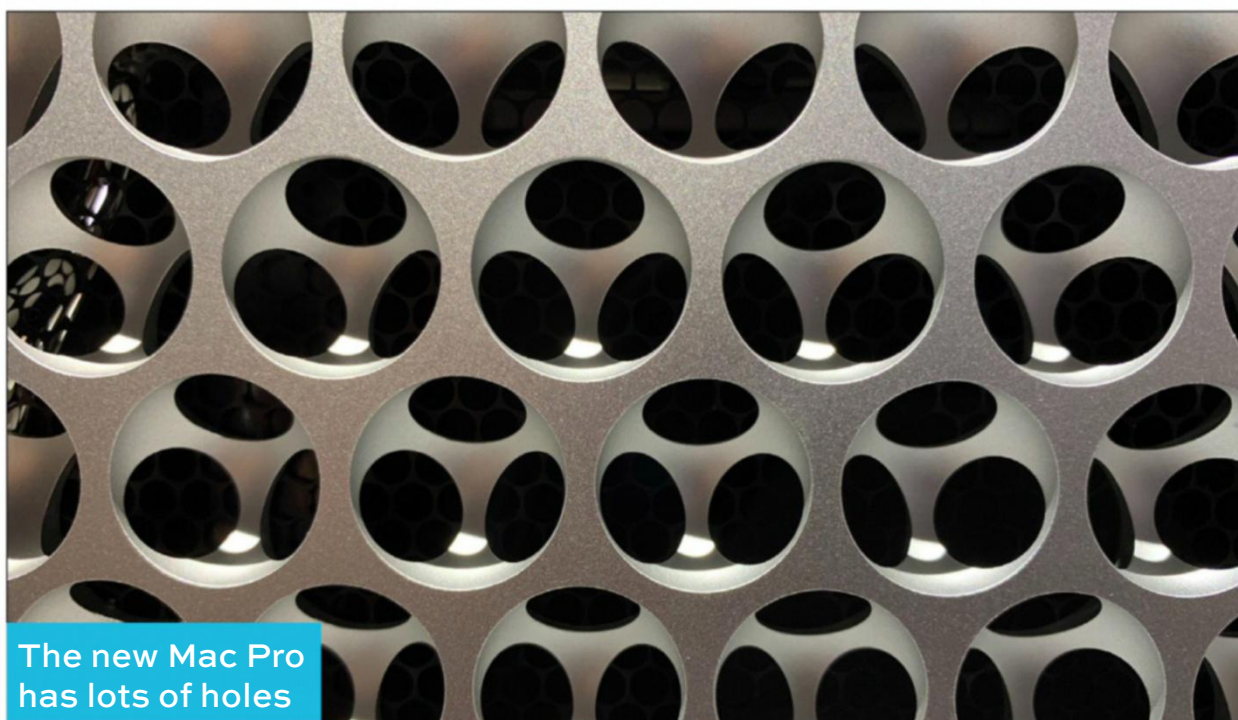


So the jokes about Apple rereleasing the cheese grater Mac turned out to be true. During its WWDC19 keynote, Apple unveiled the new modular Mac Pro that it's been teasing for the better part of two years. It looks an awful lot like the Power Mac G5 design (that was eventually

carried over to the Intel-based Mac Pro) that was retired back in 2013.

Quite frankly, Apple could have saved us all a lot of agitation if it had just released this design back in 2006. It's a natural evolution of the Power Mac G5, and I can't help but think it's one of the thousand nos from the original Mac Pro's design process. Call it a reboot.

Of course, the inside of the new Mac Pro makes the Power Mac G5 look like a toy, with “workstation-class Xeon processors up to 28 cores, a high-performance memory system with a massive 1.5TB capacity, eight PCIe expansion slots and a graphics architecture featuring the world's most powerful graphics card”. Unlike the Power Macs of old or even the cylindrical Mac Pro the new model replaces, the new Mac Pro is clearly aimed at the



The new Mac Pro has lots of holes

most discriminating of Apple users, for whom even a £15,000 iMac Pro isn't powerful enough.

It ain't easy being cheesy

The Power Mac G5 was one of Apple's more polarizing designs, especially since it followed the beloved Mirrored Drive Doors Power Mac G4. Not only was it affectionately labelled as a 'cheese grater' due to the hundreds of tiny holes on the front, it also was bigger and heavier than the Power Mac G4. And the processor's tremendous heat output limited expansion to just one optical bay, two drive bays, one 133MHz 64-bit PCI-X slot, and two 100MHz 64-bit PCI-X slots.

But the Power Mac G5 became one of Apple's longest-running designs. Lasting about 10 years and the only enclosure to survive the Intel transition, Apple's tower became iconic for its utilitarian and minimal industrial design, and eventually even loved, as Apple continued to upgrade its ports, processor, and PCI expansion with each revision. Even after it was retired, it found new life as modern furniture.

And now it's been reborn. While the new Mac Pro is distinctly different from the original model, it retains much of what made it such a timeless design. It has two handles at the top for carrying. The aluminium cover slides up to reveal the components and configuration slots. And of course, there's a whole mess of holes on the front. They're much larger than they were and seemingly designed for cooling purposes, but honestly the

new Mac Pro actually looks more like a cheese grater than the original did.

Apple didn't even change the dimensions much. The new Mac Pro might look smaller and kind of adorable in renders and photos, but it's roughly the same size as the old G5 machine and actually a little heavier:

Power Mac G5

Height: 51.1cm

Width: 20.6cm

Depth: 47.5cm

Weight: 17.8kg

2019 Mac Pro

Height: 20.8 inches 52.9cm

Width: 8.58 inches 21.8cm

Depth: 17.7 inches 45cm

Weight: 18kg

While it may seem like a lazy design that had no business taking two years to develop, that's not the way I see it. There are any number of directions Apple could have taken with the new Mac Pro to make it more modular than the current expansion nightmare, but it chose to return to an instantly recognizable design. Apple didn't over-engineer the new Mac Pro or try to reinvent the wheel like it did with the trash can design. It simply gave its users what they were asking for.

You know, the same users we all thought Apple forgot about long ago. On paper, the new Mac Pro

is a Mac veteran's dream machine, loaded with all the expansion and future-proof functionality that's missing from the current model. When Apple claims the new Mac Pro will "push the limits of what is possible", no one will question its veracity. Yes it's outrageously expensive, but no one who orders one will feel like they're getting anything less than the best possible computer money can buy.

But it's the design that matters most. At once an homage to Steve Jobs and the 'old' Apple and a vow to diehard fans, the new Mac Pro shows that Apple hasn't forgotten what it was before the iPhone turned the company into one of the richest company's on the planet. With a retro twist, the Mac Pro is a nod to bake-offs and toasted bunnies and the best possible testament to the professionals who once swore by Apple's greatness. It even has wheels. I mean Apple thought of everything.

Now if only Apple would make a Cube version for the rest of us.